Research Note 81-11

DESIGN AND DEVELOPMENT OF DIAGNOSTIC MEASURES FOR ARMOR CREWMAN PERFORMANCE--XM1

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Individual and crew tests are necessary to support XM1 tank gunnery goals and to reduce ammunition expenditures by assuring proficiency before progression to full crew performance exercises. This research was focused on developing diagnostic tests for individual crewman and crew performance evaluations for crew drills that are administerable at platoon level within four hours and do not involve live fire. Nineteen individual tests were developed and remediation guidance was developed that is centered on immediate correction of specific

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deficiencies. For crew performance, the 14 Crew Drills contained in ARI Research Product 79-17, A Prototype Crew Drills Training Program for XM1 Tank Gunnery: Company Commander's Manual, were analyzed and three drills were selected that best represent the range of gunnery behavior. Tests were developed for those three drills and remediation guidelines were prepared that focus on crew performance. Supporting material for platoon leaders and tank commanders who serve as scorers was also developed. The testing material to be issued in the unit is included as an appendix.

PREFACE

This is the final report of work performed on a project entitled, "Design and Development of Diagnostic Measures of Armor Crewmen Performance - XM1." The report describes the development of tests for individual tank crewmen and evaluations of tank crew performance.

The work was conducted by the Human Resources Research Organization (HumRRO) under Contract Number MDA 903-79-C-0584 with the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI). The work was performed at the Radcliff, Kentucky Office of HumRRO's Military Testing and Research Division, Mr. William Osborn, Director.

Mr. Donald M. Kristiansen, ARI Field Unit, Ft. Knox, was the Contracting Officer's Representative and not only provided guidance throughout the project but was actively involved in all phases. Despite his busy schedule he was always available for consultation and review.

Much of the work was based on the ARI Research Product 79-17, A Prototype Crew Drills Training Program for XM1 Tank Gunnery: Company Commander's Manual. Mr. Ronald Kraemer of the ARI Field Unit-Knox and an author of that work was most helpful in the early stages of this project to insure interface between the two efforts.

To assist in determining technical accuracy of the tests the author had access to two subject matter experts: SSG James Savage and SP5 Steven Crockett, both from H Company, 2nd Squadron, 6th Cavalry, Lightning Brigade, Ft. Knox, KY, whose knowledge of the XM1 and ready grasp of the concepts of the project provided for invigorating reviews.

Special recognition is due two members of the HumRRO MTRD, Radcliff Office staff: Charlotte Campbell and Pat Ford. Ms. Campbell was responsible for the design of the crew drill analysis and was responsible for assembling order out of the chaos of information that the author had produced. Mr. Ford's contributions occurred throughout the project but he deserves special credit for the design and organization of the test measurement instruments. His creativity and zeal accomplished the goal despite the difficulties encountered and the road blocks that the author always seemed to be placing between him and final achievement.

SUMMARY

The work in this project was responsive to anticipated needs to develop individual tests and crew evaluations to support the gunnery training program for the XM1 tank. The objectives of the project were to:

- Develop diagnostic measures of individual tasks required in performance of XM1 tank gunnery.
- Develop diagnostic measures of crew drills required in performance of XM1 tank gunnery.

Individual measures were based on a task list derived from A Prototype Crew Drills Training Program for XM1 Tank Gunnery: Company Commander's Manual, Research Product 79-17, ARI Field Unit, Fort Knox, Kentucky, November 1979. A total of 19 measures, covering the four crew positions, were developed from the task list. Tests developed were hands-on, designed for administration at platoon level, administerable within four hours and did not involve live fire gunnery. Performance measures and administration and scoring instructions were developed. To meet the requirement that the tests be diagnostic, performance was analyzed to determine probable causes of failures. A remediation model was developed which focuses training on the cause of failure and specific remediation guidance is related to specific failures on most performance measures.

Crew drill evaluations were derived from the 14 crew drills contained in A Prototype Crew Drills Training Program for XM1 Tank Gunnery: Company Commander's Manual. An analysis of the performance required in each crew drill was conducted. Crew drills were divided into two categories: normal gunnery engagements and degraded gunnery engagements. Based on the analysis of performance, two drills were selected that encompassed the largest segment of gunnery behavior for the normal drills. One drill was chosen to test the degraded drills based primarily on anticipated frequency of occurrence.

Three whole-drill evaluations were developed that could be administered at platoon level, did not involve live fire and could be conducted within four hours. Performance measures, administration and scoring instructions were prepared. To meet the requirement that the tests be diagnostic, the tests were analyzed to determine probable failures. Emphasis in diagnoses was on crew behavior rather than individual failures and remediation guidance was developed focusing on that aspect.

Supporting materials to guide the platoon leader and to orient the tank commander scorers were developed. Individual tests, crew drill evaluations, remediation guidance and supporting material are contained in Appendix C of this report.

All materials developed were based on literature and training material developed in support of the prototype XM1 tank and were reviewed for technical accuracy by crewmembers who had served on the XM1 during operational evaluations of the vehicle and weapons system.

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CHAPTER 1

INTRODUCTION

BACKGROUND

The introduction of a major new end item of equipment into the Army inventory brings with it a corresponding need to develop new training and evaluation packages to match equipment advances. Development of such training/evaluation packages has not always been systematically geared to keep pace with the milestones of equipment development. The result has sometimes been a gap between equipment introduction in units and a matching training/evaluation package. Although such gaps are usually closed quickly, it has sometimes meant that the training developer must play catch up to match the qualitative changes in equipment. To meet these demands, the training developer often applies existing methods and models of training and evaluation to the new equipment. Because the training needs of the equipment recipient are immediate, the opportunity to review and improve training and evaluation to match introduction of the new equipment is often lost.

Such has not been the situation with the Army's new main battle tank, the XM1 General Abrams. The technological advances of this weapon system have been coupled with management changes within the Armor force. Armor crewmen are no longer trained at the Armor Training Center as generalized Armor Crewmen. They are trained as position specific (tank driver and gunner-loader) and weapon system specific (M60, M60A3, XM1) individuals. This change in management concepts has had an impact on training management. A training model has been suggested which treats training along functional lines of Maintenance and Mobility and Gunnery (see Figure 1). In this model, individual skills are integrated into functional crew drills which are then integrated into unit exercises at platoon and higher levels.

In anticipation of the introduction of the XM1, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI), Ft. Knox Field Unit, has been concentrating on the gunnery function of the training model and have developed a system of gunnery crew drills (Kraemer and Kristiansen, 1979) designed to replace the draft crew drills developed earlier (U.S. Army, 1978). This ARI produced, Armor School sponsored product emphasizes a model for tank gunnery that is consistent with the Armor training model. This model likewise utilizes a building block concept (see Figure 2) and emphasizes the attainment of proficiency at each level before moving on to the next in the progression towards live fire gunnery. The goal is to maintain training effectiveness while ultimately cutting the cost requirements of live fire gunnery.

The work described herein was designed to support this model at the initial and intermediate steps in the progression; those of Individual Gunnery Skills Testing and Gunnery Crew Drill Evaluation. To meet the

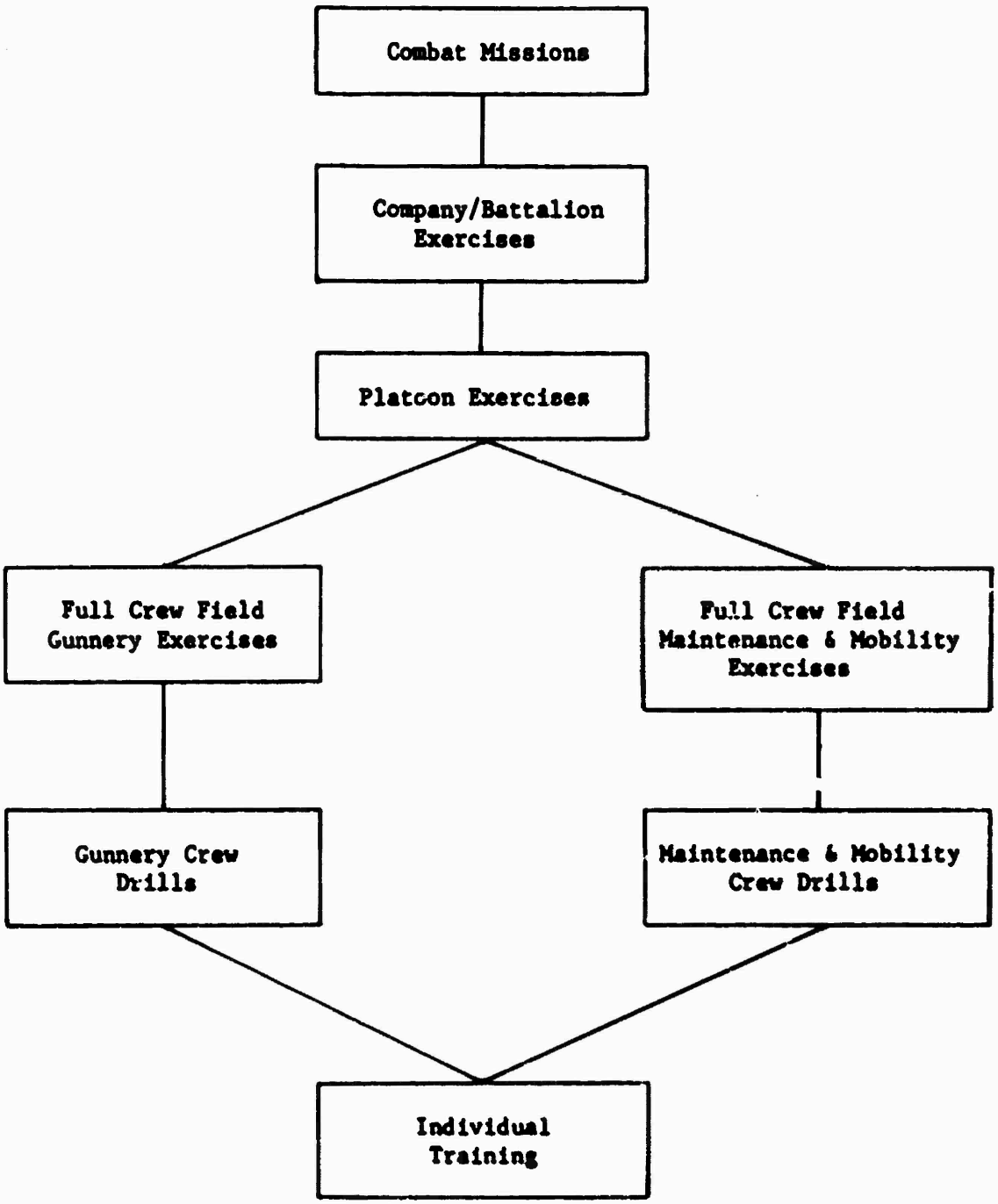

FIG. 1. Armor training model.

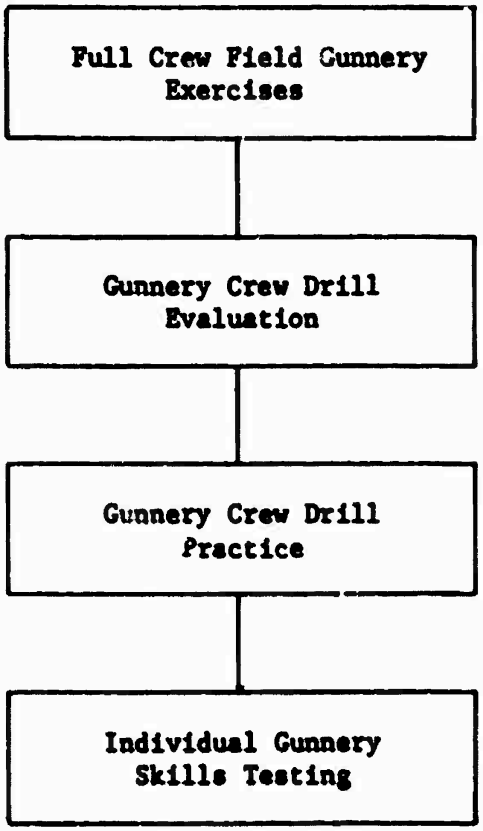

FIG. 2. Gunnery training and evaluation model.

goal of training effectiveness, these steps had to focus on rapid, basic distinctions between those individuals and crews who did not meet minimum performance standards and those who did. Equally important, the steps had to facilitate diagnosing of deficiencies and focus corrective action on those deficiencies without major disruption in progression towards live fire gunnery. To meet the goal of reducing costly live ammunition expenditures, the steps had to preclude nonqualified individuals and crews from progressing to the live fire stage before they were competent and precluded using live fire (to include subcaliber fire) to establish competency.

OBJECTIVES

The objectives of this work were twofold:

- To develop an individual gunnery skill diagnostic test for each crew position that is reliable, administerable in a time constrained period and within unit resources and is relevant to Gunnery Crew Drills.

- To develop a crew gunnery skill diagnostic test that is reliable, administerable in a time constrained period and within unit resources, does not require live fire and is relevant to Full Crew Gunnery Exercises.

The approach to each objective is outlined in the following chapters.

CHAPTER 2

DEVELOP INDIVIDUAL GUNNERY TESTS

TEST DEVELOPMENT

Concepts and Constraints

A major concept in the development of the individual tests was that they would be administered and controlled at platoon level using only resources normally available within the platoon. While the company commander would be involved in his role as training manager it was the goal that conduct and responsibility be focused at platoon level. Resources available at this level are essentially the platoon leader, a platoon sergeant, the tank commanders, and the equipment assigned to the platoon by TO&E.[1] The execution of the concept was to have the platoon leader and the platoon sergeant administer the individual tests to the tank commanders. The tank commanders would in turn administer the gunner, loader and driver tests to their respective crews.[2]

The requirement to keep the individual tests within platoon resources ruled out any sophisticated technology approach to testing such as video, gun cameras or on-vehicle fire simulators.[3] Time requirements played an even more restrictive role. While specific time limits were not imposed it was generally agreed that a platoon--using only platoon members--should be able to test everyone initially within four hours.[4]

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[1]At the time of development it was undecided whether the XM1 tank platoon would consist of 3 or 5 tanks. The tests were developed for a five tank platoon. Only minor modifications are necessary to adapt the tests to a three tank platoon.

[2]Since the platoon leader and platoon sergeant are also tank commanders, they also have to take the TC test. Several methods were investigated to accomplish this such as having the platoon leader test the platoon sergeant and vice versa (thus keeping it within one platoon) or having another platoon leader/platoon sergeant team test them. In the end, however, this was not directly addressed. The decision is essentially one that company commanders should be able to make based on their situations without specifying it in the test materials.

[3]Ultimately, for two of the tests, a BOT trainer was deemed necessary. This was not, however, considered strictly beyond platoon resources since the tests make provision for using pictures if a mechanical device is not available.

[4]This assumes that the platoon leader/platoon sergeant have already been tested on the TC test.

User perception was a very important factor in test development. For this reason it was decided to go with hands-on testing instead of written or some other form of synthetic testing. Earlier studies (Osborn and Ford, 1976; Cockrell, 1978) suggest that soldiers tend to like hands-on tests better than synthetic tests. Additionally, hands-on testing has the advantage of reducing the time between testing and remediation.

Task Selection for Individual Tests

From the work done to develop A Prototype Crew Drills Training Program for XM1 Tank Gunnery: A Company Commander's Manual, ARI provided a list of Individual Task Requirements for each of the four crew duty positions that had been derived from an analysis of the crew drills. This list (see Appendix A) contained 54 major tasks and an additional 106 subtasks or derivative tasks. It was apparent that due to the restrictions on test administration it would be necessary to pare down this list. This paring was done on the basis of three criteria:

- Criticality
- Feasibility
- Distinctiveness

Criticality. This was the most subjective of the criteria used. Initial decisions were made based on knowledge of gunnery engagements and available description of the XM1 weapons system. The main focus of the criticality judgments was relative necessity of performance for a successful engagement. Some later modification was necessary based on more complete weapon system description and subject matter expert (SME) input but for the most part early judgments of criticality stood up.

Feasibility. The requirement that the tests involve no live fire, no sophisticated measurement techniques, be administerable within platoon resources and be time constrained and that a hands-on mode was the desirable means of testing was used to further pare the list. Feasibility constraints, however, had to be weighed against criticality judgments.

Distinctiveness. The list of tasks was long in part because it was exhaustive. Many tasks and subtasks were listed more than once because they occurred under different conditions in the Crew Drills. In addition, some tasks were described differently but on close analysis the behavior was the same or very similar to other tasks. This criterion proved to be the largest factor in paring the list.

Based on these criteria, decisions were made to either test or not test the task. The tasks were thus sorted into two groups, a group on which test items would be developed and a group for which item construction would not be considered. This was not, however, a simple dichotomous classification into Select or Reject. Since there were many tasks that

were borderline on either criticality, feasibility or distinctiveness the Select category was initially divided into Select-High Priority and Select-Low Priority. As development proceeded and more input was obtained about the tasks, the Low Priority tasks were forced into either the Select or Reject category. In Appendix A the final classification of the major tasks is shown to the left of the task list. The designation "SS/D" (for Subsumed or Duplicate task) is used to identify those tasks that did not meet the criteria of distinctiveness. The rationale for rejection of specific tasks follows the Individual Task Requirements list in Appendix A.[1]

TEST CONSTRUCTION

Development of Administration Guidance

Test development was guided largely by the desire for a high level of user acceptability on the grounds that a test program that will not be used cannot be a good test program. To enhance usability it was felt the tests had to contain the correct balance of guidance in administration and scoring. Too little guidance and the scorer would not use the test the way the developers intended and the greater the probability of variations in application; too much guidance and the scorer might feel patronized and not bother to read what was provided. The approach taken was to assume an "average" tank commander who would serve as scorer. This typical tank commander was conceptualized as being fairly highly qualified on technical skills but lacking in testing skills and experience. Thus a minimum of technical guidance was given and more emphasis was placed on controlling essential test conditions and defining scorer judgments.

Development of Performance Measures

Performance measures (PM) are the steps or product characteristics scorers use as a basis to certify or withhold certification that a crewman can do the task. The scoresheets list only the minimal characteristics that require evaluation. The number is further limited by the assumption that tests are administered in sequence. PM that have been explicitly evaluated in a previous test are not repeated. Scorers are instructed to withhold certification if a crewman makes an error that is not covered by a PM. The dangers associated with this possible lack of standardization were considered secondary to the dangers associated with an imposing list of PM.

Closely associated with high acceptability was the requirement that the tests be doctrinally accurate. The PM were derived from DEP 9-2350-244-1, Draft Equipment Publication, Operator's Manual for Tank, Combat, Full Tracked, 105MM Gun, XM1, October 1978 and FM 17-12-1 (Draft) Tank Gunnery for XM1 Main Battle Tank, 1 June 1979. All tests were then reviewed for doctrinal accuracy by crewmen who have participated in operational tests of the XM1.

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[1]It is important to note in reviewing the list in Appendix A that just because a task was classified Select does not necessarily mean that a discrete test was developed for that task. However, the behavior required in the task is included within the 19 tests developed.

Development of Remediation

In order to meet the requirement that the tests be diagnostic each task was analyzed to determine what errors might occur during performance. Then, probable causes of these errors were analyzed. In many cases the probable errors and causes were straightforward such as forgetting a step or a sequence. Others were more involved such as deficiencies in technique or enabling skills. Thus two distinct lines to remediation were developed. For the simple procedural error it was deemed sufficient in most cases to call the error to the crewman's attention. More complex errors required a diagnosis prior to remediation. Likewise, the extent of errors dictated a differing approach on remediation instructions. For example, omission of a single step in some tasks may not be significant but the commission of two errors may be symptomatic of a serious performance deficiency. On other tasks a single misstep may be highly significant depending on what the step was. The end result of this rather detailed analysis was that remediation could be tailored to performance.

To maximize efficiency in the remediation training model an approach was used which modified the small group performance oriented training model (Osborn et al., 1975). In this standard model the performance training steps are:

- Demonstration
- Walk through (optional)
- Monitored practice
- Examination

The application adopted for this requirement somewhat reversed those steps. Although the classic model has proven effective, several factors prompted modification:

- Examination was already the starting point.
- In most situations the crewmen will have performed the task before.
- The remediations were likely to be one-on-one situations.
- Time was a factor.
- The remediations were likely to be less formal than most training situations.[1]

[1]An important part of performance oriented training is that it should not be formal training. But nonetheless the perception still exists among many junior leaders that when they are told they must "train," they often adopt an attitude that some formalized structure is required before training can commence. The desire here was for immediate correction geared to the individual's performance. To be avoided was the perception that training was separate and removed from the testing.

The model adapted to remediation utilized the following sequence:

. Test

. Walk through

. Demonstration (optional)

. Monitored practice

. Test

If the error cannot be corrected verbally, then the trainer demonstrates it for the examinee. Training emphasis is on primarily the steps or techniques where difficulty is evidenced or isolated. Practice and retesting are still included as part of all remediation.

FORMAT

One of the most acute problems was to develop a format for the tests, administration instructions and remediation that would meet the following criteria:

. Be easy to score.

. Be easy to use.

. Not overwhelm the scorer with printed material.

The format was chosen somewhat subjectively in the sense that no potential user reaction or tryout information was gathered. A GO/NO-GO system of scoring performance measures was adopted because of its resemblance to SQT. All platoon sergeants and tank commanders will likely have had experience as scorers on SQT. The superficial similarity of these scoresheets with SQT should enhance familiarity and adaptability on the part of the scorers. Although effort was made during development not to make the tests "mini-SQT," the advantages and commonality of SQT format was chosen to reduce the need for scorers to have to adjust to totally different scoring procedures and format.

For remediation, the NO-GO performance measures were color coded to indicate when special remediation was needed. A separate, hip-pocket size remediation booklet was developed. This format was used to reduce the number of pages the scorer must handle at one time. Additionally, remediation will likely not be needed for all tasks. Even when remediation is required, a competent scorer can readily become familiar with the contents of the remediation booklet and thereafter refer to it only as needed. For these reasons a separate, smaller booklet was decided on.

Every effort was directed toward reduction of the amount of paper needed for the tests. By adopting the concept of a typical scorer (i.e., experienced tank commander) much of the detailed guidance for setting up and administering the test that would be necessary if naive scorers were assumed was eliminated. Through parsimonious use of only necessary instructions the number of pages for both instructions and scoresheet in no case exceeds two per test.

It should be emphasized that at least three separate formats were developed and the final selection was based primarily on project staff judgment and prejudice. The entire area of format and its effect on target audience begs for further study.

The Individual Tests and Remediation Booklets are included in Appendix C.

CHAPTER 3

DEVELOP CREW GUNNERY TESTS

The concept of the Crew Drill Gunnery tests[1] was that tank crews would first practice the drills as outlined in A Prototype Crew Drills Training Program for XM1 Gunnery. This practice would be conducted under the direction of each individual tank commander. Following completion of this practice phase (see Figure 2) some means were necessary for testing to determine if crews were ready to proceed to subcaliber firing.

All the constraints and conventions which applied to the individual tests applied to the crew tests as well. They had to be platoon administered, were resource and time constrained, and precluded live fire and sophisticated measurement techniques.

CREW TASK SELECTION

A Prototype Crew Drills Training Program for XM1 Tank Gunnery contains 14 objectives or crew drills[2] (for a list of these drills see Figure 3). These drills encompass all methods of basic XM1 gunnery both when the system is completely operational and when components of the fire control system have malfunctioned.[3]

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[1]The word "test" does not appear in the Crew Drill examinations developed. They are called "evaluations" and in the scoresheets are called "Evaluation Guidelines." The effort was made to downplay the "test" connotation for both the individual and crew exercises. In the case of the individual exercises, however, the term "test" was retained. The items look like tests, are administered like tests and will be likely treated and perceived of as tests. The treatment of the Crew Drills tests is slightly different because of their closer relation to the Crew Drill practice so the term was not used. In either case the terminology is primarily semantic and more significance is probably attached to terminology by the developer than by the user.

[2]The ARI Research Product identifies the 14 training drills by both a narrative description and a 7 digit objective numerical subclassfication system (see Figure 3). Both proved too cumbersome for easy reference. Therefore a consecutive number system was adopted using the sequence the drills appeared in the ARI document. Hereinafter the drills are referred to by number 1 through 14 as identified in Figure 3.

[3]Gunnery when all systems are operational is called "Normal" gunnery and is represented by Drills 1 through 8. Component malfunction is referred to as "Degraded" gunnery and is represented in Drills 9 through 14.

Drill Number	Job Objective Number	Drill Description
1	1.1.1.1.1.1.1	Normal, Single Target, Day, Main Gun, Stationary vs. Stationary, Precision, GPS
2	1.1.1.1.2.1.1	Normal, Single Target, Day, Main Gun, Stationary vs. Moving, Precision, GPS
3	1.1.1.1.5.1.1	Normal, Single Target, Day, Main Gun, Moving vs. Stationary, Precision, GPS
4	1.1.1.1.6.1.1	Normal, Single Target, Day, Main Gun, Moving vs. Moving, Precision, GPS
5	1.1.2.1.2.1.2	Normal, Single Target, Night, Main Gun, Stationary vs. Moving, Precision, TIS
6	1.2.1.1.5.1.1	Normal, Multiple Target, Day, Main Gun, Moving vs. Two Stationary, Precision, GPS
7	1.2.1.2.5.1.1	Normal, Multiple Target, Day, Main Gun/ COAX, Moving vs. Two Stationary, Precision/ Area, GPS
8	1.3.1.1.1.1.1	Normal, Simultaneous Target, Day, Main Gun/ Cal .50, Stationary vs. Two Stationary, Precision/Point, GPS/TC Periscope
9	2.1.1.1.4.1.1	Emergency, Single Target, Day, Main Gun, Moving To a Halt vs. Moving/Precision, GPS
10	3.1.1.1.2.1.1	Degraded, Single Target, Day, Main Gun, Stationary vs. Moving, LRF Failure/ Battlesight, GPS
11	3.1.1.1.2.2.1	Degraded, Single Target, Day, Main Gun, Stationary vs. Moving, Lead Angle Sensor Failure/Precision, GPS
12	3.1.1.1.1.3.1	Degraded, Single Target, Day, Main Gun, Stationary vs. Stationary, Cant Sensor Failure/Precision, GPS
13	3.1.1.1.1.4.1	Degraded, Single Target, Day, Main Gun, Crosswind Sensor Failure/Precision, GPS
14	3.1.1.1.1.5.2	Degraded, Single Target, Day, Main Gun, Stationary vs. Stationary, GPS Failure/ Precision, GAS

FIG. 3. Drill identification.

It was necessary to select drills, part drills, or activities which would be tested because evaluating the entire set of 14 drills exceeds the time and resources available at platoon level. To do this it was necessary to closely analyze the drills.

Crew Drill Analysis

A Prototype Crew Drills Training Program for XM1 Tank Gunnery: A Company Commander's Manual presents each drill in the format of a flow chart for each crew position stating the actions that each crewmember must perform, actively or passively, during each engagement. The 14 Crew Drills were examined for individual crewman activities that are required by the drills, e.g., TC announces "Gunner, HEAT, Tank" or Loader announces "UP." A total of 273 individual crewman activities was compiled. The drills where an activity occurred were then identified (see Appendix B).

A matrix was constructed to show, for each individual crewman activity, the Crew Drills within which it was contained, e.g., the TC announces "Gunner, HEAT, Tank" appears only in Crew Drill 13 while the loader announces "UP" appears in all 14 Crew Drills. This matrix was examined to find unique patterns of individual crewman activities, e.g., the pattern - TC drops down into sight, TC verifies firing status, TC verifies firing status for the second round - exists in all the Crew Drills by 8 and 14, while the pattern - TC acquires/identifies target (stationary vs. stationary), Gunner squeezes triggers, Gunner squeezes triggers for the second round - exists in Crew Drills 1, 8, 12, 13, and 14. A total of 49 unique patterns was compiled. Of these 49 unique patterns, 23 contain only one individual crewman activity. The remaining 26 patterns contain anywhere from 2 to 26 individual crewman activities.

The 49 patterns and the Crew Drills that contain each pattern are presented in the charts in Figure 4 and Figure 5. The following types of information are contained in the figures, as indicated by the column headings:

# of Drills - This is the number of drills that contain each pattern. It ranges from a pattern being contained in only one Crew Drill to a pattern being contained in all 14 Crew Drills.

Drill - The 14 Crew Drills, numbered as in the Drill Identification presented in Figure 3.

Number of Activities - The number of activities which share the pattern, that is, how many of the 273 activities occur in the drills which make up the pattern.

In 1-8 - An asterisk in this column indicates that the individual crewman activity or activities represented by the pattern occur in at least one of the normal engagements (Drills 1-8). If there is no asterisk in the column, the individual crewman activity or activities within the pattern occur only in the degraded gunnery drills (Drills 9-14).

# of Drills	Drills														Number of Activities	In 1-8	In 7,8	Activity Number
	1	2	3	4	5	6	7	8	9	10	11	12	13	14				
14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	38	*	*	20,36,48,49,64,65,95,108,123,126,127,162,163,168 169,171-173,176,180,188,191,194,195,198,206,207, 209,229-232,243,247,257,265,271,273
13	X	X	X	X	X		X	X	X	X	X	X	X	X	1	*	*	84
13	X	X	X	X	X	X		X	X	X	X	X	X	X	1	*	*	161
13	X	X	X	X	X	X	X		X	X	X	X	X	X	10	*	*	27,35,37,42,50,107,119,135,187,189
13	X	X	X	X	X	X	X	X		X	X	X	X	X	1	*	*	68
13	X	X	X	X	X	X	X	X	X	X	X	X		X	1	*	*	178
13	X	X	X	X	X	X	X	X	X	X	X	X	X		3	*	*	62,73,99
13	X	X	X	X		X	X	X	X	X	X	X	X		1	*	*	74
12	X	X	X	X	X	X	X		X	X	X	X	X		3	*	*	21,30,45
12	X	X	X	X	X	X	X	X	X		X	X	X		2	*	*	66,97
12	X	X	X	X	X	X	X	X	X	X	X	X			1	*	*	70
11	X	X	X	X	X	X	X		X		X	X	X		1	*	*	28
10	X	X			X			X	X	X	X	X	X	X	19	*	*	105,117,124,133,174,181,183,185,192,196,200,202, 204,210,253,255,258,261,263
9	X	X			X			X		X	X	X	X	X	9	*	*	17,86,164,234,237,244,249,252,259
9		X	X	X	X	X	X		X	X	X				1	*	*	129
8	X	X	X	X	X	X	X		X						2	*	*	31,46
7	X	X			X			X			X	X	X		1	*	*	87
6	X	X			X			X	X					X	1	*	*	113
5	X							X				X	X	X	3	*	*	1,109,128
5			X	X		X	X		X						11	*	*	16,18,88,165,170,235,238-241,272
5	X	X			X			X	X						1	*	*	120
5	X	X			X				X					X	1	*		130
5		X			X				X	X	X				2	*		7,110
5		X		X	X				X		X				1	*		12
5	X		X				X	X				X			1	*	*	10

FIG. 4. Normal drill analysis by rank order of drills.

# of Drills	Drills 1	2	3	4	5	6	7	8	9	10	11	12	13	14	Number of Activities	In 1-8	In 7,8	Activity Number
5										X	X	X	X	X	1			122
4		X	X		X	X									24	*	*	106,114,118,121,125,131,134,175,182,184,186, 193,197,201,203,205,211,242,245,250,254,256,262, 264
4		X			X					X	X				1	*		77
4	X											X	X	X	1	*		76
4										X	X	X	X		3			32,47,132
3			X			X	X								3	*	*	2,91,111
3						X	X	X							2	*	*	80,166
3		X			X					X					1	*		90
3											X	X	X		1			116
2						X	X								7	*	*	5,138,213,266-269
2				X					X						3	*		3,79,92
2										X				X	1			67
1			X												1	*		78
1				X											1	*		112
1					X										8	*		4,19,75,81-83,167,236
1						X									17	*		8,13,51,52,85,139-145,212,214-217
1							X								34	*		53-59,146-160,218-228,233
1								X							18	*	*	6,22-26,38,39,43,44,60,61,96,136,137,190,208,270
1									X						8			9,69,94,177,246,248,251,260
1										X					5			15,29,89,98,115
1											X				1			104
1												X			2			101,102
1													X		6			11,71,100,103,179,199
1														X	8			14,33,34,40,41,63,72,93
Number of Activities	1 102	2 103	3 106	4 106	5 110	6 129	7 147	8 104	9 112	10 103	11 103	12 104	13 105	14 96	273	237	200	

FIG. 4 (Cont'd.). Normal drill analysis by rank order of drills.

# of Drills	Drills														Number of Activities	In 1-8	In 7,8	Activity Number
	1	2	3	4	5	6	7	8	9	10	11	12	13	14				
14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	38	*	*	20,36,48,49,64,65,95,108,123,126,127,162,163,168, 169,171-173,176,180,188,191,194,195,198,206,207, 209,229-232,243,247,257,265,271,273
1							X								34	*	*	53-59,146-160,218-228,233
4			X	X		X	X								24	*	*	106,114,118,121,125,131,134,175,182,184,186,193, 197,201,203,205,211,242,245,250,254,256,262,264
10	X	X			X			X	X	X	X	X	X	X	19	*	*	105,117,124,133,174,181,183,185,192,196,200,202, 204,210,253,255,258,261,263
1								(							18	*	*	6,22-26,38,39,43,44,60,61,96,136,137,190,208,270
1						X									17	*		8,13,51,52,85,139-145,212,214-217
5			X	X		X	X		X						11	*	*	16,18,88,165,170,235,238-241,272
13	X	X	X	X	X	X	X		X	X	X	X	X	X	10	*	*	27,35,37,42,50,107,119,135,187,189
9	X	X			X			X		X	X	X	X	X	9	*	*	17,86,164,234,237,244,249,252,259
1					X										8	*		4,19,75,81-83,167,236
1									X						8			9,69,94,177,246,248,251,260
1														X	8			14,33,34,40,41,63,72,93
2						X	X								7	*	*	5,138,213,266-269
1													X		6			11,71,100,103,179,199
1										X					5			15,29,89,98,115
13	X	X	X	X	X	X	X	X	X	X	X	X	X		3	*	*	62,73,99
12	X	X	X	X	X	X	X		X	X	X	X	X		3	*	*	21,30,45
4										X	X	X	X		3			32,47,132
2				X					X						3	*		3,79,92
5	X							X				X	X	X	3	*	*	1,109,128
3			X			X	X								3	*	*	2,91,111
8	X	X	X	X	X	X	X		X						2	*	*	31,46
1												X			2			101,102
3						X	X	X							2	*	*	80,166
5		X			X				X	X	X				2	*		7,110
12	X	X	X	X	X	X	X	X	X		X	X	X		2	*	*	66,97
13	X	X	X	X	X	X	X	X	X	X	X	X		X	1	*	*	178
13	X	X	X	X	X		X	X	X	X	X	X	X	X	1	*	*	184
13	X	X	X	X	X	X		X	X	X	X	X	X	X	1	*	*	161
13	X	X	X	X	X	X	X	X		X	X	X	X	X	1	*	*	68

FIG. 5. Normal drill analysis by rank order of activities.

# of Drills	Drills														Number of Activities	In 1-8	In 7,8	Activity Number
	1	2	3	4	5	6	7	8	9	10	11	12	13	14				
12	X	X	X	X		X	X	X	X	X	X	X	X		1	*	*	74
11	X	X	X	X	X	X	X		X		X	X	X		1	*	*	28
4	X											X	X	X	1	*		76
1			X												1	*		78
1				X											1	*		117
6	X	X			X			X	X					X	1	*	*	113
5		X		X	X				X		X				1	*		12
5	X		X				X	X				X			1	*	*	10
5	X	X			X				X					X	1	*		130
3		X			X					X					1	*		90
1											X				1			104
2										X				X	1			67
3											X	X	X		1			116
5										X	X	X	X	X	1			122
4		X								X	X				1	*		77
7	X	X			X			X			X	X	X		1	*	*	87
5	X	X			X			X	X						1	*	*	120
9		X	X	X	X	X	X		X	X	X				1	*	*	129
12	X	X	X	X	X	X	X	X	X	X	X	X			1	*	*	70
	1	2	3	4	5	6	7	8	9	10	11	12	13	14				
Number of Activities	102	103	106	106	110	129	147	104	112	103	103	104	105	96	273	237	200	

FIG. 5 (Cont'd.). Normal drill analysis by rank order of activities.

In 7-8 - An asterisk in this column indicates that the individual crewman activity or activities represented by the pattern occur in Drill 7 and/or Drill 8. (The purpose of this column and the rationale for concentrating on Drill 7 and 8 are explained below.)

Activity Number - The identification number(s) of the individual crewman activity or activities represented by the pattern. The activity description corresponding to each number is given in the Master Activity List in Appendix B.

At the foot of each chart is given the number of activities that occur in each drill, in all drills, in Drills 1 through 8, and in Drills 7 and/or 8.

The same information is contained in both Figure 4 and Figure 5. They differ only in the order in which the patterns are presented. Figure 4 presents the patterns in descending order by the number of drills containing the pattern. Thus patterns which are included in the most Crew Drills appear first, and patterns which are contained in only one Crew Drill are last. Figure 5 presents the patterns in descending order by the number of activities characterized by the pattern. Here, the patterns containing many individual crewman activities appear first, and those which contain only one activity appear last.

The following two examples illustrate how the chart is used:

Example 1. In Figure 4 the first row indicates that there are 38 activities which occur in each of the 14 drills. Those 38 activities are identified by numbers from the Master Activity List in the last column.

Example 2. Also in Figure 4, the second row indicates that one activity (84) occurs in all drills except Drill 6. The Master Activity List shows this is a gunner activity, "Announce Identified." (Further analysis of Drill 6 shows that this activity is replaced with the activity, "Recognize Prioritized Target--Announce 'Identified.'" This distinctive activity is required because the drill involves two main gun engagements. Thus it is important to realize that the significance of a particular pattern is apparent only when the one looks at the total picture.)

The main information drawn from using these figures is the significance in using Drills 7 and 8 as a test basis for exercising the greatest number of activities. All pairwise combinations of drills were examined during analysis. The goal was to achieve the greatest activity coverage using the fewest drills. As indicated at the foot of the column headed, "In 7-8," 200 activities are covered in the conduct of Drills 7 and 8. This represents

73.3% of all activities and 84.4% of the normal engagement activities. No other combination of two drills covers as many activities. It may be determined from the charts that to pick up a significant number of all of the rest of the total activities would involve testing a greatly increased number of drills. To include all 273 activities would involve testing or part testing of 12 of the drills, all but Drills 1 and 2.

The conclusion drawn from this analysis was three-fold:

- Consider the drills in two parts, i.e., normal (Drills 1 through 8) and degraded (Drills 9 through 14).
- Use Drills 7 and 8 to test the normal engagements.
- Do not attempt to include more activities from normal engagements. The infrequency of their occurrence does not warrant the testing effort required.

With the decision to test Drill 7 and Drill 8, at least as far as the normal engagements were concerned, it was necessary to isolate what activities would not be subjected to evaluation. A total of 37 activities were thus identified and are shown in Figure 6. A review of these activities did not reveal any activities that it was judged necessary to evaluate in a crew environment.

Degraded Drill Selection

A similar analysis was conducted on only the degraded drills (Drills 9-14). Figure 7 and Figure 8 present a pattern analysis for the degraded drills similar to what was done previously for all drills (1 through 14). Again, the information is shown in two ways. Figure 7 arrays the patterns by the number of Crew Drills which contain them. Figure 8 arrays the patterns by the number of individual crewman activities they contain.

Numerically, two drills stood out as testing candidates. Drill 9 and Drill 13 would, if tested, exercise over half of the 36 degraded only skills (52.8%). But the conclusion was not as clear cut as was the case previously with the normal drills. More of the activities were unique to a particular drill and the number of activities were less meaningful when the drills were further anlayzed. For example, in Drill 9, the majority of activities are centered around the driver; only 3 of the 8 activities involve the TC or gunner.

The disparity of activities is a result of the nature of the drills. A recap shows the following occurring:

Drill 9 - Emergency (Stabilization Failure)

Drill 10 - LRF Failure

Drill 11 - Lead Angle Sensor Failure

37 Activities Not Tested
in Drill 7-8

Tank Commander

*3	Acquire/ID target - moving vs. moving
4	Acquire/ID target - night
7	Acquire/ID target - stationary vs. moving
8	Acquire/ID most dangerous target
12	Announce "Gunner, SABOT, Moving Tank"
13	Announce "Gunner, SABOT, Right [Left] Tank"
19	Squeeze palm switch/Lay main gun for direction (night)
51	Announce "Target, Left [Right] Tank"
52	Main gun engagement - 3rd round

Gunner

75	Place TIS magnification in 10x
76	Detect target - stationary vs. stationary
77	Detect target - stationary vs. moving
78	Detect target - moving vs. stationary
79	Detect target - moving vs. moving
81	Detect target - TIS
82	Adjust polarity
83	Adjust focus - TIS
85	Recognize prioritized target - "Identified"
90	Track moving target while stationary
92	Track moving target while moving
110	Squeeze triggers and continue to track
112	Squeeze triggers and continue to track moving target while moving
130	Relay on center of target - 2nd round
139	Switch magnification to 3x
140	Search for announced target - target 2
141	Detect target - target 2
142	Place magnification in 10x
143	"Identified" target - target 2
144	Release/squeeze palm switches - target 2
145	Engage target - target 2

Loader

167	Search/Acquire/Report target (night)
212	Swing guard to ARMED - 3rd round
214	Listen for "IDENTIFIED" - 2nd target
215	Continue loading - 2nd target
216	Swing guard to SAFE - final round (5th)
217	Ram round into breech while moving - 5th round

*Number on Master Activity List (Appendix B)

FIG. 6. Activities not tested.

Analysis of Degraded Drills

(9 through 14)

Pattern of Activities Unique To Degraded Drills

# of Drills	Drills 9	10	11	12	13	14	Number of Activities	Activity Number
5		X	X	X	X	X	1	122
4		X	X	X	X		3	32,47,132
3			X	X	X		1	116
2		X				X	1	67
1	X						8	9,69,94,177,246,248,251,260
1		X					5	15,29,89,98,115
1			X				1	104
1				X			2	101,102
1					X		6	11,71,100,103,179,199
1						X	8	14,33,34,40,41,63,72,93
Number of Activities (only in 9-14)	8	10	6	7	11	10	36	

FIG. 7. Degraded drill analysis by rank order of drills.

Analysis of Degraded Drills

(9 through 14)

Pattern of Activities Unique To Degraded Drills

# of Drills	Drills 9	10	11	12	13	14	Number of Activities	Activity Number
1	X						8	9,69,94,177,246,248,251,260
1						X	8	14,33,34,40,41,63,72,93
1					X		6	11,71,100,103,179,199
1		X					5	15,29,89,98,115
4		X	X	X	X		3	32,47,132
1				X			2	101,102
1			X				1	104
2		X				X	1	67
3			X	X	X		1	116
5		X	X	X	X	X	1	122
Number of Activities (only in 9-14)	8	10	6	7	11	10	36	

FIG. 8. Degraded drill analysis by rank order of activities.

Drill 12 - Cant Sensor Failure

Drill 13 - Crosswind Sensor Failure

Drill 14 - GPS Failure

The six degraded conditions will probably not occur with the same frequency or have equally detrimental effect on crew performance or be equally difficult for the crew to react to. However, at this stage there was little XM1 performance data upon which to base a decision. What there was, however, seemed to indicate that Drill 10 - LRF Failure and Drill 14 - GPS Failure would be the prime candidates for testing. This was based primarily on anticipated frequency of malfunction and the degree of measureable variation when that malfunction occurs. The decision was made to test these two drills as an evaluation of the degraded drills.[1]

TEST DEVELOPMENT

Alternate Evaluation Methods

A variety of testing methods were investigated for evaluating the Crew Drills. Measurement of crew functions always poses some inherent problems. Because they affected the final choice of test method they are worth some discussion.

Nature of Crew Performance. The first problem is that crew performance is composed of individual actions, but they are more than just a composite of indiviual actions. The emphasis in crew performance is on interaction on the assumption that it is a blending of individual actions in coordination with each other that makes for successful crew performance. As with any team effort the sum is greater than the individual efforts, i.e., the crew can carry lapses by an individual member or poor crew interaction can cause a qualified crewman to err. The problem is compounded because gunnery interactions are neither routine nor completely standardized. Target presentation, terrain, weather, mechanical characteristics and time pressures all affect crews to make each engagement distinctive. This makes the decision of what to look for in evaluating a crew drill a difficult one.

[1]But ultimately such was not to be the case. The LRF inputs range data automatically into the system. When the LRF fails the crew must go to a battlesight engagement. During development of Drills 7 and 8 provisions had to be made for conducting the evaluations in locations where laser safe ranges were not readily available. To provide for this, instructions were included to run Drills 7 and 8 under battlesight conditions. Since this was the same drill as when an LRF failure occurs, a separate evaluation for Drill 10 was not prepared.

Observability. An observer (evaluator) who is physically on the tank but outside the turret is limited in what he can physically observe during an engagement. This is particularly true for the gunner and driver who are physically invisible to an observer on the turret or deck of a tank. Because sophisticated measurement devices such as video, gun cameras, and fire simulators were not feasible in this evaluation, reliance had to be placed on external manifestations of behavior of crew positions instead of direct observation of behavior.

Time Constraints. A single main gun engagement with two rounds can be completed in 30 seconds or less from target acquisition to cease fire. An evaluator who does not know exactly what is to occur is certainly lost. An evaluator who does know what is occurring may not be able to observe it all.

With these problems in mind it is worth looking at three methods of evaluation which were considered and rejected before the method finally chosen is discussed.

Part Drill Evaluation. One alternate was to evaluate only a small part of the drill at a time, e.g., target acquisition, initial fire command, and so on. This would require the evaluator to concentrate on only a small segment of behavior. It would also allow all discrete sections of the 14 Crew Drills to be evaluated. But Crew Drills and engagements cannot be performed in segments any more than a golfer can perform just his backswing. A Crew Drill is a whole of activities and cannot be meaningfully segmented by the crew and still retain the concept of a Crew Drill. An alternative is to have the crew perform the entire drill with the observer concentrating on only that aspect of performance being evaluated (as in the golf analogy, the entire drive is performed but the evaluating pro only attends to the backswing). But even this presented development problems. It is unknown what segments of a crew performance can be effectively processed by an evaluator and indeed it probably varies from evaluator to evaluator. If the segments are too small it means a prohibitive number of tiring (even boring) repetitions of the drill by the crew while the evaluator makes his ratings. If the segments are too large, then the evaluator is not better off in gathering his data than when the complete drill was performed. There still is more occurring than the evaluator can effectively process.[1]

Crew Substitution. Substituting the evaluator for a member of the crew overcomes much of the observation problem and even, to some extent, the time constraints. But once substituted the evaluator is no longer a passive observer--he is an active member of the crew and the whole concept of crew evaluation is lost. This concept is used extensively with the TC, gunner and driver individual tests but there something different is being evaluated. Once substitution is made something may still be evaluated but it is certainly not the crew.

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[1]But a compromise approach was deemed possible, as shall be shown in the discussion of the method chosen.

Self Evaluation. Assuming a highly qualified and experienced crew, no one knows better about what went right, what went wrong, and is better able to reconstruct an engagement than the crew itself. An evaluation based solely on controlled crew input is probably the best means of diagnosing crew performance that there is, assuming further that the crew is sufficiently motivated to provide critical evaluation. But this is exactly what occurs (or is supposed to occur) during the phase when crew drill practice is performed. If the crew drill practice is deemed sufficient then this evaluation phase is not needed. But as with any type of training, crew drill practice in itself does not provide the supervisor (platoon leader and company commander) with any reliable assurance that it has been effective. An external check (short of live fire gunnery) is needed to provide closure to crew drill practice.

Evaluation Method Selected

The method that was finally chosen for crew evaluations was to test the three crew drills in their entirety as performed by the full crew using the platoon leader/platoon sergeant as an external evaluator. A distinct advantage is achieved by both using an entire existing drill and in using the platoon leader/platoon sergeant. First, the drill is established and familiar. For the crew a minimum orientation is needed as to what is occurring. The crew is performing something that they should have performed several times before. Except for the presence of an external evaluator there are no differences in what they have been practicing. The crew does not have to be oriented to a new procedure for the purposes of evaluation. Second, the platoon leader/platoon sergeant scorers are also tank commanders. They know what is occurring or what is supposed to occur during the drill.

Development of Performance Measures

For the selection of the measurement points or performance indicators the goal was to select those indicators that provided the best diagnoses of crew performance. However, precluded from using a product evaluation (rounds on target) it was necessary to go to intermediary indicators.[1] Additionally these indicators had to be overt,

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[1]And here "indicators" is used in the true sense of the word. During live fire when a round hits on target it is an indicator that all crew and individual events leading up to that have probably been performed correctly. But most systems hit probability is approximately 0.5, not 1.0. Therefore while a hit shows that performance was at or close to standard, a miss does not provide any information about crew performance. When live fire is precluded and one is working from the reverse, the successful accomplishment of all the intermediate measures results in the assumption that the goal will probably be achieved. Each unsuccessful aspect of performance lessens the probability. This assumption is warranted if the steps required in individual and crew training have any validity. But it is important to keep in mind (and to convey to the user whenever possible) that successful performance on the evaluation indicates probability, not certainty, although performance to standard on the procedures minimizes error variance attributable to the crew.

easily recognizable, easily scored and above all lead to certain conclusions about crew (as versus individual) performance. The overt measurement points selected were, of necessity, individual performance measures but all scorer instruction and remediation is aimed at taking the analysis beyond individual performance into crew performance and multiple crew interactions. The performance measures are primarily designed to give the scorer an orientation in time and event and he must then use his knowledge of the drill to conduct the scoring. For example, the scoring performance measure may be the gunner announcing "Identified" within a time limit. Failure to do so may be because of the gunner's failure to identify, his failure to announce it, the TC's failure to lay properly, or the TC's failure to react properly and timely when the gunner fails to announce. If remediation is to be effective the scorer must determine what actually occurred.

One concern about the performance measures selected was that most are oriented towards verbal manifestations of interaction by the crew and seem to ignore such things as manipulation of controls, switches, and accuracy of lay. However, even beyond the feasibility problems discussed earlier it is felt that additional measurement points are not necessary. The whole context and setting of the crew evaluation must be taken into account. Individual proficiency has already been established. Crews have spent a great deal of time practicing these same crew drills. Their behavior should be habitual during the drill evaluation. Although it is possible for individual lapses in performance to slip through, most crew deficiencies should be manifested in the performance measures included. It is important to also remember that the crew is not oriented toward the performance measures; they are oriented towards the complete drill and this is what they will be performing. The performance measures are scorer directed; not crew training oriented. Thus, crew behavior is dictated by the crew drill, not the listed performance measures.

To insure doctrinal accuracy, the crew drill performance measures were derived from the flow charts in A Prototype Crew Drills Training Program For XM1 Gunnery: Company Commander's Manual and reviewed by crewmen who had participated in operational tests of the XM1.

Development of Remediation

Within crew drills there are two types of failures possible--individual and crew. Each possible individual failure was analyzed to determine if failure could be caused by something other than the individual himself performing incorrectly. Thus much of the remediation guidance is aimed at insuring the evaluation identifies exactly who is responsible for a failure. Where failures can be traced to individual errors the trainer is directed to correct that performance as is done with the individual test.

But the most important part of remediation is that which focuses on true crew interactions. Again the separate actions were analyzed to determine where the actions were a coordinated or shared responsibility. Those so identified are keyed to specific remediation instructions.

Drill Administration

It was decided to have each drill evaluation run a minimum of two times. It is believed that two runs will be necessary to obtain complete scoring and to provide some measure of continuity in performance. Beyond the two mandatory measurements the scorer is free to conduct the drill as many times as is necessary to arrive at an accurate score.

FORMAT

To some extent the format for the crew evaluations was dictated by the format chosen for the individual tests. Basic similarity was maintained although some differences were introduced. The Evaluation Guidelines (scoresheets) are oriented by subevent (e.g., first main gun round, caliber .50 and so on) and by crew position to allow the scorer to focus on a particular event or crew position. The dual blocks for checking GO and NO-GO were dropped in favor of a single block in which the scorer will mark off only NO-GO. This was done to speed recording during the rapid occurrence of events.

As with the individual tests emphasis was placed on reducing the amount of paper the scorer has to contend with. Because the intended user is the platoon leader/platoon sergeant and they will be knowledgeable and familiar with the Crew Drills, instructions could be kept brief. Evaluation instructions and scoresheets are kept to two pages per test.

The Crew Drill Evaluations and Remediation Booklet are contained in Appendix C.

CHAPTER 4

SUPPORTING MATERIAL

Supporting material to the individual tests and crew evaluations was constructed with two goals in mind.

- To prepare and inform the platoon leader on the purpose and use of the materials.
- To prepare the tank commanders for their role as scorers.

The platoon leader guidelines primarily outlines what is going to occur, how events should proceed and the purpose and goals of the two evaluations. Emphasis is placed on his previewing all the test material. Information contained in the test material or available to him through its review is not repeated in his instructions.

The tank commander's orientation was more difficult to arrive at. Initially it was planned to have a participant training session during which the tank commanders would practice scoring tasks while other tank commanders would play the role of examinees. Some performance situations would be standardized by the platoon leader to insure exercise of the remediation model, i.e., errors would be committed on purpose by the examinee that would lead the scorer into the remediation model. Although this type of training is very effective (Campbell, 1979) it was eventually not done for the following reasons:

- It is difficult to set up, particularly at platoon level.
- It would require detailed instructions for the platoon leader which would possibly contribute to the impression that the testing is more complex than it actually is.
- It is time consuming.
- The size of the training audience (three tank commanders) did not seem to warrant the effort required.
- The tasks and their scoring are not complex for the anticipated ability level of the scorers.

An intermediate position was also strongly debated in which the platoon leader/platoon sergeant would demonstrate a testing/scoring/remediation situation for the tank commanders. Ultimately this was also dropped for the same reasons described above although the adverse impact is less severe than with full scorer participation.

The final decision was to outline a verbal orientation for the platoon leader to present to the tank commanders. The primary purpose of this is to get the test instruments in the hands of the scorers and have them reviewed under the control of the platoon leader and platoon sergeant. To be successful this approach relies on the understanding of the materials and the abilities of these individuals, but since the entire execution of these evaluations lies there also it will be necessary to allow them to carry the ball sooner or later anyway.

The advantages of a more detailed initial training session still exist however. Ultimately, if the tests were to be universally implemented, the use of a 15-20 minute videotape suggests itself as the ideal medium to illustrate to the scorers the principles and procedures desired without many of the drawbacks discussed earlier. Although the development of such was beyond the purview of this project, such goal should be kept in mind at least as a supplement to any other type of orientation. Such an approach could also be used for the platoon leader instructions replacing or supplementing those currently in existence.

The Platoon Leader Guidelines and Tank Commander orientation are contained in Appendix C.

CHAPTER 5

CONCLUSIONS

No revolutionary testing concepts have been conceived during this development. But the overall purpose has been to provide a strong usable framework for evaluations. Three innovations[1] are noteworthy:

- The platoon is the implementing and evaluating unit.
- Remediation is focused on needs.
- Maximum but controlled flexibility is provided in implementation and outcome.

The tests, however, have a potential for being abused. If the company or battalion does not allow the platoon leader freedom to use the tests on his own; if the emphasis of the evaluations is on ratings rather than diagnoses; and if the effort is on achieving GOs rather than identifying and remediating potential problems, then these tests will join a long list of testing efforts where the tests have merely become an end goal in themselves rather than a means of achieving a larger goal. If, however, the tests are used as planned and within the philosophy expressed in A Prototype Crew Drills Training Program for XM1 Tank Gunnery: A Company Commander's Manual, then the evaluations should be a valuable tool in the tank gunnery program.

Field validation and unit tryouts of the evaluations was not a phase of this project and the tests cannot be considered as completed until this is accomplished. Likewise the tests were developed before the production model of the XM1 was in hand. Technical evaluation and doctrinal changes could well affect the final content of these tests. But it is believed that the framework for the tests is both solid and workable and that changes necessitated by the results of unit tryouts and technological evolution can be accomodated within the framework developed.

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[1] "Innovations" is perhaps too strong. These concepts are basic. But few tests achieve them. Somehow test development invariably gets too complex and escalates implementation and utilization to too high a level. This development has strived throughout to not lose sight of these basics.

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APPENDIXES

APPENDIX A

TANK GUNNERY CREW DRILLS: XM1

TANK GUNNERY CREW DRILLS: XM1

Individual Task Requirements

Tank Commander

	1	Performing ready-to-fire procedures
SS/D	1.1	Preparing for caliber .50 machinegun firing
	2	Loading weapons
SEL	2.1	Loading the caliber .50 machinegun
	2.1.1	Safing the machinegun
	2.1.2	Opening/closing the cover
	2.1.3	Loading ammo in feedtray
	2.1.4	Arming the machinegun
	2.1.4.1	Charging the machinegun
	3	Engaging targets
SEL	3.1	Acquiring targets
	3.1.1	Identifying thermal targets
SEL	3.2	Determining method of target engagement
SEL	3.3	Issuing fire commands
REJ	3.4	Issuing driving commands
	3.4.1	Directing Driver toward target
SS/D	3.5	Positioning weapons
	3.5.1	Positioning weapon station
	3.5.1.1	Traversing the station
	3.5.1.2	Elevating/depressing machinegun
SEL	3.6	Laying on targets
	3.6.1	Applying machinegun methods of fire
	3.6.1.1	Applying point fire method
SEL	3.7	Tracking targets
REJ	3.8	Ranging to targets for caliber .50 engagement
	3.8.1	Estimating range to targets
SEL	3.9	Firing on targets
	3.9.1	Firing caliber .50 machinegun
	3.9.1.1	Firing electrically
REJ	3.10	Adjusting fire
	3.10.1	Adjusting caliber .50 machinegun fire
	3.10.1.1	Applying Burst-on-Target (BOT) method
	4	Handing-off targets
SS/D	4.1	Acquiring targets
	4.1.1	Identifying thermal targets
SS/D	4.2	Determining method of target engagement
SS/D	4.3	Issuing fire commands

Code

SEL - Select
REJ - Reject
SS/D - Subsumed elsewhere for testing or duplicate task

REJ- - - - - 4.4 Issuing driving commands
4.4.1 Directing Driver toward target
SEL- - - - - 4.5 Laying main gun for direction
4.5.1 Traversing the turret
4.5.2 Elevating/depressing the gun
SEL- - - - - 4.6 Ranging to targets
4.6.1 Battlesight ranging to targets
4.6.2 Estimating range to targets
SEL- - - - - 4.7 Monitoring target engagement
4.7.1 Identifying correct sight picture
4.7.2 Identifying correct tracking
4.7.3 Identifying correct lasing
4.7.4 Identifying ready-to-fire status

5 Performing post-firing procedures
REJ- - - - - 5.1 Performing main gun post-fire procedures
REJ - - - - - 5.2 Performing caliber .50 machinegun post-fire procedure

6 Unloading weapons
SEL- - - - - 6.1 Unloading the caliber .50 machinegun
6.1.1 Safing the machinegun
6.1.2 Opening/closing the cover
6.1.3 Clearing the machinegun
SEL- - - - - 7.1 Round Sensing

Gunner

1 Performing ready-to-fire procedures
SEL- - - - - 1.1 Preparing for main gun firing
REJ- - - - - 1.2 Preparing for coaxial machinegun firing

2 Loading weapons
SEL- - - - - 2.1 Loading the coaxial machinegun
2.1.1 Safing the machinegun
2.1.2 Opening/closing the cover
2.1.3 Loading ammo in feedtray
2.1.4 Arming the machinegun
2.1.4.1 Charging the machinegun

3 Engaging targets
SEL- - - - - 3.1 Acquiring targets
3.1.1 Acquiring announced targets
3.1.1.1 Identifying thermal targets
SS/D - - - - 3.2 Positioning gun/turret
3.2.1 Traversing the turret
3.2.2 Elevating/depressing the gun

Code
SEL - Select
REJ - Reject
SS/D - Subsumed elsewhere for testing or duplicate task

SEL- - - - - 3.3 Laying on targets
- 3.3.1 Applying main gun methods of fire
- 3.3.1.1 Applying precision fire method
- 3.3.1.2 Applying battlesight fire method
- 3.3.2 Applying machinegun methods of fire
- 3.3.2.1 Applying area fire method
- 3.3.3 Applying target leads
- 3.3.5 Applying cant correction

SEL- - - - - 3.4 Tracking targets

SEL- - - - - 3.5 Ranging to targets
- 3.5.1 Laser ranging to targets
- 3.5.2 Estimating range to targets
- 3.5.3 Applying announced range to targets

REJ- - - - - 3.6 Firing on targets
- 3.6.1 Determining ready-to-fire status
- 3.6.2 Firing the main gun
- 3.6.2.1 Firing electrically
- 3.6.3 Firing the coaxial machinegun
- 3.6.3.1 Firing electrically

SEL- - - - - 3.7 Round sensing

SEL- - - - - 3.8 Adjusting fire
- 3.8.1 Adjusting main gun fire
- 3.8.1.1 Applying reengage method
- 3.8.1.2 Applying Burst-on-Target (BOT) method
- 3.8.1.3 Applying Standard Adjustment
- 3.8.1.3.1 Applying target form method
- 3.8.2 Adjusting coaxial machinegun fire
- 3.8.2.1 Applying Burst-on-Target (BOT) method

4 Performing post-firing procedures

REJ- - - - - 4.1 Performing main gun post-fire procedure

REJ- - - - - 4.2 Performing coaxial machinegun post-fire procedure

5 Unloading weapons

SEL- - - - - 5.1 Unloading the coaxial machinegun
- 5.1.1 Safing the machinegun
- 5.1.2 Opening/closing the cover
- 5.1.3 Clearing the machinegun

Loader

1 Performing ready-to-fire procedures

SS/D - - - - 1.1 Preparing for main gun firing

REJ- - - - - 1.2 Preparing for coaxial machinegun firing

2 Loading weapons

SEL- - - - - 2.1 Loading the main gun
- 2.1.1 Safing the main gun

Code
SEL - Select
REJ - Reject
SS/D - Subsumed elsewhere for testing or duplicate task

2.1.2 Removing round from ready ammo compartment
2.1.2.1 Opening/closing ammo door electrically
2.1.2.2 Identifying main gun ammo
2.1.2.3 Removing ammo from stowage tube
2.1.2.4 Handling main gun ammo
2.1.3 Loading ammo in breech
2.1.4 Arming the main gun
REJ- - - - - 2.2 Loading the coaxial machinegun
2.2.1 Safing the machinegun
2.2.2 Opening/closing the cover
2.2.3 Loading ammo in feedtray
2.2.4 Arming the machinegun
2.2.4.1 Charging the machinegun

3 Unloading weapons
SEL- - - - - 3.1 Unloading the main gun
3.1.1 Safing the main gun
3.1.2 Removing round from breech
3.1.2.1 Opening/closing breech manually
3.1.2.2 Handling main gun ammo
3.1.3 Stowing ammo in ready ammo compartment
3.1.2.1 Opening/closing ammo door electrically
3.1.2.2 Loading round in stowage tube
3.1.2.3 Setting ammo letter codes
REJ- - - - - 3.2 Unloading the coaxial machinegun
3.2.1 Safing the machinegun
3.2.2 Opening/closing the cover
3.2.3 Clearing the machinegun

4 Performing post-firing procedures
REJ- - - - - 4.1 Performing main gun post-fire procedure
REJ- - - - - 4.2 Performing coaxial machinegun post-fire procedure

Driver

1 Performing ready-to-fire procedures
REJ- - - - - 1.1 Preparing for main gun firing
1.2 Preparing for coaxial machinegun firing

2 Driving the tank
SS/D - - - - 2.1 Placing the tank in motion
2.1.1 Releasing the parking brake
2.1.2 Shifting the transmission
2.1.3 Accelerating/decelerating the engine
2.1.4 Steering the tank
2.1.4.1 Driving forward

Code

SEL - Select
REJ - Reject
SS/D - Subsumed elsewhere for testing or duplicate task

SS/D - - - - 2.2 Acquiring targets
2.2.1 Acquiring announced targets
SS/D - - - - 2.3 Selecting routes
SEL- - - - - 2.4 Maneuvering the tank for firing
2.4.1 Firing on-the-move
2.4.1.1 Positioning the tank for firing
2.4.1.2 Responding to TC driving commands
2.4.1.3 Maintaining steady speeds
2.4.1.4 Identifying adverse terrain
2.4.1.5 Identifying defilade firing positions
2.4.2 Firing from a halt
2.4.2.1 Positioning tank for firing
2.4.2.2 Responding to TC driving commands
2.4.2.3 Identifying adverse terrain
2.4.2.4 Identifying defilade firing positions
SS/D- - - - - 2.5 Stopping the tank
2.5.1 Applying service brakes

REJ - - - 3 Round sensing

REJ - - - 4 Performing post-firing procedures

Code
SEL - Select
REJ - Reject
SS/D - Subsumed elsewhere for testing or duplicate task

RATIONALE FOR TASKS REJECTED

Tank Commander Tasks

Task 3.4 Issuing Driving Commands

This task is totally dependent on the conditions of the terrain, target and situation. More importantly, it reflects the TC's arrangement with and knowledge of his driver. To test this task with a standardized driver would not predict performance with his own driver.

Task 3.8 Ranging To Targets for Caliber .50 Engagement

Estimating range is the same requirement whether it is in conjunction with a main gun engagement, coax engagement, caliber .50 engagement or just done for its own sake. Since range estimation is evaluated in conjunction with main gun engagements a separate evaluation of caliber .50 ranging is not warranted.

Task 4.4 Issuing Driving Commands (see Task 3.4)

Task 5.1 Performing Main Gun Post-Fire Procedure

No procedure other than calling for or acknowledging crew reports was identified under this task. This was judged to have insufficient criticality.

Task 5.2 Performing Caliber .50 Machinegun Post-Fire Procedure

No procedure other than placing the weapon on SAFE was identified under this task. Since weapon familiarity is being tested elsewhere, this was judged to have insufficient criticality for separate testing.

Gunner Tasks

Task 1.2 Preparing for Coaxial Machinegun Firing

The steps required for the gunner to prepare for coax engagements are a variation of the same steps performed in preparing for main gun engagement. The variations were not sufficiently different or the procedure judged sufficiently critical under these circumstances to warrant separate testing.

Task 3.6 Firing on Targets

Except for the act of pulling the trigger the requirements of actual firing were beyond the feasibility constraints imposed.

Task 4.1 Performing Main Gun Post-Fire Procedure

The only procedure identified here was to place the Gun Select switch in SAFE and report the status to the TC. These were judged to be of insufficient criticality to warrant testing.

Task 4.2 Performing Coaxial Machinegun Post-Fire Procedure (see preceding comment on Task 4.1)

Loader Tasks

Task 1.2 Preparing for Coaxial Machinegun Firing

During gunnery, the coax is primarily the gunner's responsibility. This task is judged of insufficient criticality for loader testing.

Task 2.2 Loading the Coaxial Machinegun (see preceding comment on (Task 1.2)

Task 3.2 Unloading the Coaxial Machinegun (see preceding comment on Task 2.2)

Task 4.1 Performing Main Gun Post-Fire Procedure

The only procedure identified under this task was to clear the turret of spent brass, report status to the TC and to load another round if directed by the TC. These were judged of insufficient criticality for separate testing.

Task 4.2 Performing Coaxial Machinegun Post-Fire Procedure

During gunnery the coax is primarily the gunner's responsibility. This task was judged of insufficient criticality for loader testing.

Driver Tasks

Task 1.1 Preparing for Main Gun Firing

Except for bracing himself, there were no driver procedures identified under this task.

Task 1.2 Preparing for Coaxial Machinegun Firing

There were no specific driver procedures identified under this task.

Task 3. Round Sensing

Although this is potentially important skill to assist the gunner and TC it is certainly a secondary requirement for the driver particularly in XM1 gunnery where most engagements will be during high speed movement when driver concentration on driving is required. This task is judged of insufficient criticality for driver testing.

Task 4. Performing Post-Fire Procedures

There were no specific driver procedures identified under this task.

APPENDIX B

MASTER ACTIVITY LIST

MASTER ACTIVITY LIST

The following list contains all the activities or actions contained in the flow diagrams for A Prototype Crew Drills Training Program for XM1 Tank Gunnery: Company Commander's Manual. Activities are organized by crew position and are numbered consecutively. As much as possible the activities are sequential within duty position. An "X" under the Drill Number columns indicate the activity occurs or could occur during that drill.

Drills 1 through 8 are "normal" gunnery engagements. Drills 9 through 14 represent emergency or degraded gunnery.

The words used herein to describe the action or activity will not correspond exactly to the words used in the flow diagrams. Different descriptions were used to take into account changing conditions where it was judged that the changed conditions could affect the task being performed. For example, in the flow chart the gunner activity, "Track target," is listed as the same step for all drills. In this list, that activity is identified as "Track moving target while stationary," "Track (stationary) target while moving," and "Track moving target while stationary." Conversely, some flow chart activities are listed several times and on this list only once. For example, the driver activity, "Monitor displays," appears on the flow chart several times during an engagement. However, since it is a continuous action, it appears on this list only once.

All actions or activities were listed, including conditional or passive steps indicated on the flow diagrams by broken line boxes. However, time lines were not included.

This list contains a total of 273 activities, broken out by crew position as follows:

TC - 64

Gunner - 99

Loader - 70

Driver - 40

The 273 activities represent all activities which occur or could occur in any of Drills 1 through 14. If only the "normal" engagements represented by Drills 1 through 8 are used, there are 237 activities; the remaining 36 activities are unique to emergency or degraded gunnery as represented by the crew drills.

	TC	DRILL NUMBER													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Acquire/ID Target - stationary vs. stationary	X							X				X	X	X
2	Acquire/ID Target - moving vs. stationary			X			X	X							
3	Acquire/ID Target - moving vs. moving				X					X					
4	Acquire/ID Target - night					X									
5	Acquire/ID Target - moving vs. multiple						X	X							
6	Acquire/ID Target - stationary vs. multiple								X						
7	Acquire/ID Target - stationary vs. moving		X			X				X	X	X			
8	Acquire/ID most dangerous target						X								
9	Announce "Driver, STOP"									X					
10	Announce "Gunner, SABOT, Tank"	X		X				X	X				X		
11	Announce "Gunner, HEAT, Tank"													X	
12	Announce "Gunner, SABOT, Moving Tank"		X		X	X				X		X			
13	Announce "Gunner, SABOT, Right (or Left) Tank"						X								
14	Announce "Gunner, SABOT, Tank, (Range)"														X
15	Announce "Gunner, Battlesight, Moving Tank"										X				
16	Direct Driver toward target			X	X		X	X		X					
17	Squeeze Palm Switch/Lay Main Gun for Direction (stationary)	X	X			X			X		X	X	X	X	X
18	Squeeze Palm Switch/Lay Main Gun for Direction (moving)			X	X		X	X		X					
19	Squeeze Palm Switch/Lay Main Gun for Direction (night)					X									
20	Listen for "Identified"/Release Palm Switch	X	X	X	X	X	X	X	X	X	X	X	X	X	X
21	Drop down into sight	X	X	X	X	X	X	X		X	X	X	X	X	
22	Drop down into periscope								X						
23	Announce "Fire and Adjust, Caliber Fifty"								X						
24	Place Elev Crank Handle Safety in Fire								X						
25	Look through TC periscope								X						
26	Traverse Cdr's Wpn Station towards target								X						
27	Listen for "UP"	X	X	X	X	X	X	X		X	X	X	X	X	X
28	Monitor Lase	X	X	X	X	X	X	X		X		X	X	X	
29	Ensure 1600 is displayed in sight										X				
30	Verify Firing Status	X	X	X	X	X	X	X		X	X	X	X	X	
31	Ensure Fire MALF OFF	X	X	X	X	X	X	X		X					
32	Check/Adjust Final Lay										X	X	X	X	
33	Lay on Target w/ Binoculars														X
34	Allow Time for Gunner to Fine Lay														X
35	Announce "FIRE"	X	X	X	X	X	X	X		X	X	X	X	X	X
36	Listen for "ON THE WAY"/Brace for recoil	X	X	X	X	X	X	X	X	X	X	X	X	X	X
37	Round Sense (Remain Silent)	X	X	X	X	X	X	X		X	X	X	X	X	X
38	Estimate Range to Target (50 cal.)								X						

	TC	DRILL NUMBER													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
39	Place estimated Range line on target (50 cal.)								X						
40	Relay Binoculars on Target														X
41	Determine MIL/Meter Adjustment														X
42	Moniter Fire Adjust - 1st Rd	X	X	X	X	X	X	X		X	X	X	X	X	X
43	Fire Cal .50								X						
44	Adjust Cal .50								X						
45	Verify Firing Status - 2nd Rd	X	X	X	X	X	X	X		X	X	X	X	X	
46	Ensure Fire HALF OFF - 2nd Rd	X	X	X	X	X	X	X		X					
47	Check/Adjust Final Lay - 2nd Rd										X	X	X	X	
48	Listen for "UP" - 2nd Rd	X	X	X	X	X	X	X	X	X	X	X	X	X	X
49	Listen for "ON THE WAY"/Brace for Recoil - 2nd Rd	X	X	X	X	X	X	X	X	X	X	X	X	X	X
50	Round Sense - 2nd Rd "Target Cease Fire"	X	X	X	X	X	X	X		X	X	X	X	X	X
51	Announce "Target, Left (Right) Tank"						X								
52	Main Gun Engagement - 3rd Rd						X								
53	Announce "Gunner, COAX, Troops"							X							
54	Direct/Steer Driver Towards Coax Tgt							X							
55	Lay Gun for Coax Target							X							
56	Listen for "Identified"/Release Palm Switch - coax							X							
57	Announce "FIRE" - coax							X							
58	Monitor Engagement - coax							X							
59	Announce "Cease Fire" - coax							X							
60	Place Elev Crank Handle Safety in (SAFE)								X						
61	Announce "TC complete"								X						
62	Return to Open Hatch	X	X	X	X	X	X	X	X	X	X	X	X	X	
63	Search for Other Targets														X
64	Acknowledge Crew Reports	X	X	X	X	X	X	X	X	X	X	X	X	X	X

		DRILL NUMBER													
	GUNNER	1	2	3	4	5	6	7	8	9	10	11	12	13	14
65	Search/Acquire/Report Target	X	X	X	X	X	X	X	X	X	X	X	X	X	X
66	Ensure Laser in "Arm Last Rtn"	X	X	X	X	X	X	X	X	X		X	X	X	
67	Ensure Laser in "SAFE"										X				X
68	Ensure Fire Control in "Normal"	X	X	X	X	X	X	X	X		X	X	X	X	X
69	Ensure Fire Control in "EMEP"									X					
70	Ensure Ammo Selection APDS	X	X	X	X	X	X	X	X	X	X	X	X		
71	Ensure Ammo Select in HEAT													X	
72	Ensure APDS/HEAT reticle is in sight														X
73	Ensure Gun Select in MAIN	X	X	X	X	X	X	X	X	X	X	X	X	X	
74	Ensure Magnification in 10x	X	X	X	X		X	X	X	X	X	X	X	X	
75	Place TIS magnification in 10x					X									
76	Detect Target (stationary - stationary)	X											X	X	X
77	Detect Target (stationary - moving)		X			X					X	X			
78	Detect Target (moving - stationary)			X											
79	Detect Target (moving - moving)				X					X					
80	Detect Target (multiple)						X	X	X						
81	Detect Target (TIS)					X									
82	Adjust Polarity					X									
83	Adjust Focus (TIS)					X									
84	Announce Identified	X	X	X	X	X		X	X	X	X	X	X	X	X
85	Recognize Prioritized Target - "Identified"						X								
86	Squeeze Palm Switches	X	X			X			X		X	X	X	X	X
87	Lay on TARGET CENTER	X	X			X			X			X	X	X	
88	Lay on Target Center While Moving			X	X		X	X		X					
89	Lay on Target Base										X				
90	Track Moving Target While Stationary		X			X					X				
91	Track Target While Moving			X			X	X							
92	Track Moving Target While Moving				X					X					
93	Lay announced Range Line on target center														X
94	Brace for Stopping									X					
95	Listen for "UP"	X	X	X	X	X	X	X	X	X	X	X	X	X	X
96	Acknowledge "FIRE and Adjust"								X						
97	Depress Laser Fire Button	X	X	X	X	X	X	X	X	X		X	X	X	
98	Ensure "1600" is displayed in sight										X				
99	Check Firing Status	X	X	X	X	X	X	X	X	X	X	X	X	X	

	GUNNER	DRILL NUMBER 1	2	3	4	5	6	7	8	9	10	11	12	13	14
100	Identify Direction of Cross Wind													X	
101	Identify Direction of CANT												X		
102	Aim High Opposite Direction of CANT												X		
103	Apply Aim Off for HEAT													X	
104	Apply Lead for APDS/TGT Speed											X			
105	Make Final Lay	X	X			X			X	X	X	X	X	X	X
106	Make Final Lay, While Moving			X	X		X	X							
107	Listen for "FIRE"	X	X	X	X	X	X	X		X	X	X	X	X	X
108	Announce "ON THE WAY"	X	X	X	X	X	X	X	X	X	X	X	X	X	X
109	Squeeze Triggers	X							X				X	X	X
110	Squeeze Triggers and Continue to Track		X			X				X	X	X			
111	Squeeze Triggers and Continue to Track While Moving			X			X	X							
112	Squeeze Triggers and Continue to Track Moving Target While Moving				X										
113	Relay on Center of Target	X	X			X			X	X					X
114	Relay on Center of Target While Moving			X	X		X	X							
115	Relay on Center of Target Base										X				
116	Relay on Target Aiming Point											X	X	X	
117	Round Sense	X	X			X			X	X	X	X	X	X	X
118	Round Sense While Moving			X	X		X	X							
119	Listen for TC Command	X	X	X	X	X	X	X		X	X	X	X	X	X
120	Adjust Fire (Reengage)	X	X			X			X	X					
121	Adjust Fire (Reengage) While Moving			X	X		X	X							
122	Adjust Fire (BOT)										X	X	X	X	X
123	Check Firing Status - 2nd Round	X	X	X	X	X	X	X	X	X	X	X	X	X	X
124	Make Final Lay - 2nd Round	X	X			X			X	X	X	X	X	X	X
125	Make Final Lay While Moving - 2nd Round			X	X		X	X							
126	Listen for UP - 2nd Round	X	X	X	X	X	X	X	X	X	X	X	X	X	X
127	Announce "ON THE WAY" - 2nd Round	X	X	X	X	X	X	X	X	X	X	X	X	X	X
128	Squeeze Triggers - 2nd Round	X							X				X	X	X
129	Squeeze Triggers and Continue to Track - 2nd Round		X	X	X	X	X	X		X	X	X			
130	Relay on Center of Target - 2nd Round	X	X			X				X					X
131	Relay on Center of Target While Moving - 2nd Round			X	X		X	X							
132	Relay on Target Aiming Point - 2nd Round										X	X	X	X	
133	Round Sense - 2nd Round	X	X			X			X	X	X	X	X	X	X
134	Round Sense While Moving - 2nd Round			X	X		X	X							
135	Listen for TC Command - 2nd Round	X	X	X	X	X	X	X		X	X	X	X	X	X

	GUNNER	DRILL NUMBER 1	2	3	4	5	6	7	8	9	10	11	12	13	14
136	Listen for "TC Complete"								X						
137	Announce "Target Cease Fire"								X						
138	Release Palm Switches - New Target						X	X							
139	Switch Magnification to 3x						X								
140	Search for Announced Target - Target 2						X								
141	Detect Target - Target 2						X								
142	Place Magnification in 10x						X								
143	"Identified" Target - Target 2						X								
144	Release/Squeeze Palm Switches - Target 2						X								
145	Engage Target - Target 2						X								
146	Place GUN SELECT in COAX							X							
147	Search for Announced Target - COAX							X							
148	Detect Target - COAX							X							
149	Identified Target - COAX							X							
150	Release/Squeeze Palm Switches - COAX							X							
151	Lay on Target Center - COAX							X							
152	Track Target - COAX							X							
153	Announce "ON THE WAY" - COAX							X							
154	Fire 20-25 Rd bursts - COAX							X							
155	Round Sense - Coax							X							
156	Adjusts Fire (BOT) - COAX							X							
157	Listen for TC Command - COAX							X							
158	Place GUN SELECT in MAIN							X							
159	Check Coax Spent Cartridge Container							X							
160	Unload & Clear Coax							X							
161	Release Palm Switches	X	X	X	X	X	X		X	X	X	X	X	X	X
162	Check/Adjust MRS	X	X	X	X	X	X	X	X	X	X	X	X	X	X
163	Report Firing Status	X	X	X	X	X	X	X	X	X	X	X	X	X	X

	LOADER	DRILL NUMBER 1	2	3	4	5	6	7	8	9	10	11	12	13	14
164	Search/Acquire/Report Target (stationary)	X	X			X			X		X	X	X	X	X
165	Search/Acquire/Report Target (moving)			X	X		X	X		X					
166	Search/Acquire/Report Target (multiple)						X	X	X						
167	Search/Acquire/Report Target (night)					X									
168	Drop Down Into Hatch	X	X	X	X	X	X	X	X	X	X	X	X	X	X
169	Ensure Gun/Turret Drive in "POWERED"	X	X	X	X	X	X	X	X	X	X	X	X	X	X
170	Fasten Seat Belt			X	X		X	X		X					
171	Swing Guard to "ARMED"	X	X	X	X	X	X	X	X	X	X	X	X	X	X
172	Announce "UP"	X	X	X	X	X	X	X	X	X	X	X	X	X	X
173	Listen for "IDENTIFIED"	X	X	X	X	X	X	X	X	X	X	X	X	X	X
174	Press/Hold Knee Switch	X	X			X			X	X	X	X	X	X	X
175	Press/Hold Knee Switch While Moving			X	X		X	X							
176	Place Turret Blower to "ON"	X	X	X	X	X	X	X	X	X	X	X	X	X	X
177	Brace for Stopping									X					
178	Identify APDS	X	X	X	X	X	X	X	X	X	X	X	X		X
179	Identify HEAT													X	
180	Release APDS/HEAT Tab	X	X	X	X	X	X	X	X	X	X	X	X	X	X
181	Slide Out Round	X	X			X			X	X	X	X	X	X	X
182	Slide Out Round While Moving			X	X		X	X							
183	Swivel and Release Knee Switch	X	X			X			X	X	X	X	X	X	X
184	Swivel and Release Knee Switch While Moving			X	X		X	X							
185	Move Clear of Recoil	X	X			X			X	X	X	X	X	X	X
186	Move Clear of Recoil While Moving			X	X		X	X							
187	Listen for "FIRE"	X	X	X	X	X	X	X		X	X	X	X	X	X
188	Listen for "ON THE WAY"/Brace for Recoil	X	X	X	X	X	X	X	X	X	X	X	X	X	X
189	Listen for TC Command	X	X	X	X	X	X	X		X	X	X	X	X	X
190	Listen for "CEASE FIRE"								X						
191	Swing Guard to "SAFE"	X	X	X	X	X	X	X	X	X	X	X	X	X	X
192	Ram Round Into Breech	X	X			X			X	X	X	X	X	X	X
193	Ram Round Into Breech While Moving			X	X		X	X							
194	Swing Guard to Armed - 2nd Round	X	X	X	X	X	X	X	X	X	X	X	X	X	X
195	Announce "UP" - 2nd Round	X	X	X	X	X	X	X	X	X	X	X	X	X	X
196	Press and Hold Knee Switch - 3rd Round	X	X			X			X	X	X	X	X	X	X
197	Press and Hold Knee Switch While Moving - 3rd Round			X	X		X	X							
198	Release APDS Tab - 3rd Round	X	X	X	X	X	X	X	X	X	X	X	X	X	X
199	Release HEAT Tab - 3rd Round													X	
200	Slide Out Round - 3rd Round	X	X			X			X	X	X	X	X	X	X

		DRILL NUMBER													
	LOADER	1	2	3	4	5	6	7	8	9	10	11	12	13	14
201	Slide Out Round While Moving - 3rd Round			X	X		X	X							
202	Swivel & Release Knee Switch - 3rd Round	X	X			X			X	X	X	X	X	X	X
203	Swivel & Release Knee Switch While Moving - 3rd Round			X	X		X	X							
204	Move Clear of Recoil - 2nd Shot	X	X			X			X	X	X	X	X	X	X
205	Move Clear of Recoil While Moving - 2nd Shot			X	X		X	X							
206	Listen for "ON THE WAY"/Brace for Recoil - 2nd Shot	X	X	X	X	X	X	X	X	X	X	X	X	X	X
207	Listen for TC Command - 2nd Shot	X	X	X	X	X	X	X	X	X	X	X	X	X	X
208	Listen for "TC Complete" - .50 Cal.								X						
209	Swing Guard to SAFE - 3rd Round	X	X	X	X	X	X	X	X	X	X	X	X	X	X
210	Ram Round Into Breech - 3rd Round	X	X			X			X	X	X	X	X	X	X
211	Ram Round Into Breech While Moving - 3rd Round			X	X		X	X							
212	Swing Guard to ARMED - 3rd Round						X								
213	Announce "UP" - 3rd Round						X	X							
214	Listen for "IDENTIFIED" - 2nd Target						X								
215	Continue Loading - 2nd Target						X								
216	Swing Guard to SAFE - Final (5th) Round						X								
217	Ram Round Into Breech While Moving - 5th Round						X								
218	Acquire Target - COAX							X							
219	Moniter Coax Ammo Box							X							
220	Listen for "IDENTIFIED" - Coax Target							X							
221	Check Replenisher Reservoir - Coax Target							X							
222	Listen for "FIRE" - Coax Target							X							
223	Listen for "ON THE WAY" - Coax Target							X							
224	Continue to Moniter Coax Ammo Box							X							
225	Remove Spent Coax Ammo							X							
226	Reload Coax/Ammo Box							X							
227	Listen for TC Command - COAX							X							
228	Ensure Weapons are "SAFED"							X							
229	Place Turret Blower in "OFF"	X	X	X	X	X	X	X	X	X	X	X	X	X	X
230	Check Replenisher Reservoir	X	X	X	X	X	X	X	X	X	X	X	X	X	X
231	Report Loading Status	X	X	X	X	X	X	X	X	X	X	X	X	X	X
232	Remove Spent Ammo	X	X	X	X	X	X	X	X	X	X	X	X	X	X
233	Remove Spent Coax Ammo							X							

	DRIVER	DRILL NUMBER 1	2	3	4	5	6	7	8	9	10	11	12	13	14
234	Search/Acquire/Report Target - Stationary	X	X			X			X		X	X	X	X	X
235	Search/Acquire/Report Target - Moving			X	X		X	X		X					
236	Search/Acquire/Report Target - Night					X									
237	Ensure Park Brake Is ON	X	X			X			X		X	X	X	X	X
238	Acquire Target From TC			X	X		X	X		X					
239	Steer Toward Target			X	X		X	X		X					
240	Establish A Steady Speed			X	X		X	X		X					
241	Alert Crew of Obstacles			X	X		X	X		X					
242	Search for Hull Defilade Positions			X	X		X	X							
243	Monitor Fire Command	X	X	X	X	X	X	X	X	X	X	X	X	X	X
244	Maintain Engine RPMs	X	X			X			X		X	X	X	X	X
245	Maintain Steady Speed/Direction			X	X		X	X							
246	Maintain Tank Readiness									X					
247	Monitor Displays	X	X	X	X	X	X	X	X	X	X	X	X	X	X
248	Bring Tank To a Smooth Halt									X					
249	Search for Announced Target	X	X			X			X		X	X	X	X	X
250	Continue Search for Hull Defilade			X	X		X	X							
251	Search for Other Targets									X					
252	Plan Route of Departure	X	X			X			X		X	X	X	X	X
253	Brace for Recoil	X	X			X			X	X	X	X	X	X	X
254	Brace for Recoil While Driving			X	X		X	X							
255	Round Sense	X	X			X			X	X	X	X	X	X	X
256	Round Sense While Driving			X	X		X	X							
257	Listen for TC Command	X	X	X	X	X	X	X	X	X	X	X	X	X	X
258	Continue Target Search	X	X			X			X	X	X	X	X	X	X
259	Continue Planning Exit Route	X	X			X			X		X	X	X	X	X
260	Search for Hull Defilade from STOP									X					
261	Brace for Recoil - 2nd Round	X	X			X			X	X	X	X	X	X	X
262	Brace for Recoil While Driving - 2nd Round			X	X		X	X							
263	Round Sense - 2nd Round	X	X			X			X	X	X	X	X	X	X
264	Round Sense While Driving - 2nd Round			X	X		X	X							
265	Listen for TC Command - 2nd Round	X	X	X	X	X	X	X	X	X	X	X	X	X	X
266	Acquire Target from TC - 2nd Target						X	X							
267	Steer Toward Target - 2nd Target						X	X							
268	Repeat Target Engagement - 2nd Target						X	X							

	DRIVER	DRILL NUMBER													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
269	Listen for TC Command - 2nd Target						X	X							
270	Listen for "TC Complete"								X						
271	Listen for Driving Command	X	X	X	X	X	X	X	X	X	X	X	X	X	X
272	Adjust Speed/Direction			X	X		X	X		X					
273	Report Driving Status	X	X	X	X	X	X	X	X	X	X	X	X	X	X

APPENDIX C

INDIVIDUAL TESTS, CREW DRILL EVALUATIONS AND REMEDIATION BOOKLETS

PLATOON LEADER GUIDANCE
INDIVIDUAL AND CREW EVALUATIONS

Introduction. The Individual and Crew Evaluation Package is designed to give to you, the platoon leader, a rapid, accurate, and flexible means of evaluating your platoon on basic skills as you prepare for live fire gunnery with the XM1. The package can be administered, scored, remediated, and controlled within the platoon using your available resources.

The evaluations are conducted in two phases--individual and crew. The individual evaluations are completed before the platoon starts crew drill practice. The package has seven products to help with this phase:

- Briefing for Tank Commanders
- Individual Tests for Tank Commanders
- Individual Tests for Gunners
- Individual Tests for Loaders
- Individual Tests for Drivers
- Remediation Booklet for Individual Tests for Tank Commanders and Crew Drill Evaluation
- Remediation Booklet for Individual Tests for Gunners, Loaders, and Drivers

The crew evaluations are completed after crew drill practice (as described in A Prototype Crew Drills Training Program for XM1 Tank Gunnery: Company Commander's Manual) and before the start of subcaliber firing. The package has two products to help with this phase:

- Crew Drills Evaluations
- Remediation Booklet for Individual Tests for Tank Commanders and Crew Drill Evaluation

Sequence. The sequence for the evaluations is as follows:

1. The company commander will make provisions for you and the platoon sergeant to take the Individual Tank Commander's Test.
2. You will assemble the platoon's tank commanders and give them the briefing (a suggested format is in the package). To be prepared to answer any questions at this time, you must be familiar with all the evaluation material.
3. You and your platoon sergeant will administer the Individual Tank Commander Tests to the tank commanders in your platoon.

4. The tank commanders will administer the remaining individual tests to their crews. During this time you and the platoon sergeant will monitor and assist with the testing and remediation.

5. The tank commanders will conduct the Crew Drill practices.

6. The company commander will arrange for you and the platoon sergeant and your crews to be evaluated on the Crew Drills.

7. You and your platoon sergeant will evaluate the remaining crews in the Crew Drills.

Administration. Your company commander will establish guidelines for the full Crew Drill training process. Within those guidelines, you are responsible for the conduct and outcome of the evaluations. You are solely responsible for scheduling and setting up the conditions for the Tank Commander Individual Tests and the Crew Drill Evaluations. You share responsibility with the tank commanders for the Individual Tests of their crewmen. The extent of your shared responsibility depends largely on your style of leadership and the needs of your crews, but at a minimum you should allocate time, designate an area, and be present for the Individual Tests.

Although no test requires much time or elaborate conditions, you need some plan to provide time for the tests when the crews will be at a suitable location. For example, the tests can be conducted in conjunction with motor stables or unit tactical training, but unless time is specifically set aside for testing each crew, the test will probably not be emphasized enough to be meaningful.

Remediation. Guidance for remediating shortcomings is a distinctive part of all tests in the package. The purpose of the guidance is to let you, the platoon sergeant and the tank commanders focus your training on the steps that give the crewman trouble. Since the tasks are basic and most crewmen will have performed such tasks before, the remediation for most steps is standard:

. If a step was omitted, remind the crewman to do the step. Retest.

. If a step was done wrong, talk the crewman through the step. Have the crewman practice the step. Retest.

. If the crewman cannot do the step while you talk him through it, demonstrate the step. Have the crewman practice the step. Retest.

But some steps are complicated enough that the crewman needs to modify his technique to do the step well enough. Such steps are color coded on the scoresheet. The color code directs you to the part of the Remediation

Booklet that suggests an approach to efficient training. Naturally, experienced trainers will often adapt the suggestions to fit the needs of the crewman.

Crew Drill Evaluation. Crew Drill Evaluations are somewhat different in their application than the Individual Tests. By the time you administer the Crew Drill Evaluations, your platoon will have been certified on the Individual Tests and practiced the Crew Drills. At Crew Drill Evaluation you concentrate on the crew and how they interact and function collectively. Any NO-GO during Crew Drill Evaluation indicates a crew deficiency that must be corrected. The remediation guidance for the Crew Evaluations focuses on interactions between crewmen. If, on close study, you trace a crew NO-GO to an individual's shortcoming, you should correct that shortcoming as indicated in the Remediation Booklet for the Individual Tests.

Flexibility. Although the evaluation instruments look like tests, and are treated like tests, and, in fact, are sometimes called tests, they are different from most tests. Where most tests are intended to identify the difference in ability among people, these tests are intended to provide a framework for identifying and fixing shortcomings in each person. This difference in purpose requires more flexibility than most test packages.

These tests can be modified to accommodate individual differences. The scoresheets contain Performance Measures (PM) that were derived by analyzing the activities that individuals and crews must perform to be successful in gunnery. But individuals, crews, and units are different and some crewmen and crews can perform tasks differently from the steps outlined in the PM and still be successful. For example, "Fasten seat belt" is not a PM even though most XM1 loaders will be most effective if they fasten their seat belts before they load. It is not tested because some loaders cannot effectively function with the seat belt fastened. But if your unit policy is to require the seat belt for all loaders, you should add the PM. Therefore, one of your first steps should be to review the Individual Tests and Crew Evaluations with your tank commanders to determine if the tests fit the way your crews operate. If the tests do not fit, they can be modified. When you modify the tests, apply the following criteria:

1. The modification must not violate any safety requirements. That is, individuals will not be endangered or equipment damaged if the PM is dropped or changed.

2. The modification must reflect an accepted, doctrinally sound alternative to the PM. That is, experienced tankers must agree that alternative is a correct way of performance.

3. The modification must be approved by the company commander.

Certification. Another difference between this program and most tests is that there is no place to indicate whether a crewman failed or passed. Instead, there is a place to certify that a crewman can do the task. The concept of certification has three important implications.

The first implication is that there are no failures in the program. If a crewman or a crew does not do a task well enough, they get more training and are retested. That process is repeated until the person responsible for certifying is convinced that the crewman or crew can do the task correctly.

The second implication is that there is more room than usual for subjective evaluation. As discussed in the section on flexibility, the certifier has some options on the standard. Every scoresheet provides space to increase the standard. There may also be cases where the standard should be lowered. The point is that the words and marks on the scoresheet are not the only basis for deciding to certify or not. The man who signs his name makes the final decision on the ability of the crewman or crew.

The third implication of certification is that the program should be administered in the platoon within guidelines established by your company commander. No policy dictates personnel actions based on these tests. By design, any "teeth" in enforcing the program come from you. Therefore, nothing is to be gained by certifying crewmembers or crews if you doubt they are ready for the next phase of gunnery training. You may choose to ignore the shortcomings, but they will surface again during live fire gunnery and this should be impressed on your tank commanders when they certify their individual crewmen.

Quality Control. You should be prepared to apply the Individual Tests yourself to any crewmember before and during the Crew Drills practice. This type of quality control guards against the development of bad habits by crewmembers, reinforces what they have learned, and demonstrates that you take the program seriously. You may do this randomly or selectively. Your company commander will do the same both with the Individual Tests and the Crew Drills Evaluations.

Records. Nothing in the tests and evaluations requires the establishment or keeping of records. Generally the scoresheets and Evaluation Guidelines are meant to be working papers for you, the platoon sergeant and the tank commanders. However, to help you keep track of the status of your platoon, a sample Platoon Certification Record is attached. Your company commander may or may not require that this be maintained.

PLATOON CERTIFICATION RECORD

PLT __________ PLT LDR ____________

TANK		INDIVIDUAL TEST									CREW EVALUATION			
NUMBER	CREW NAME	1	2	3	4	5	6	7	8	NOTES	1	2	3	NOTES
	TC													
	GR													
	LD													
	DR													
	TC													
	GR													
	LD													
	DR													
	TC													
	GR													
	LD													
	DR													
	TC													
	GR													
	LD													
	DR													
	TC													
	GR													
	LD													
	DR													

Enter the date certified in the block under the test or evaluation.

TC ORIENTATION

(Assemble the TCs and any others who will be used to score the individual tests. Issue the test packets to the TCs if you have not already done so. The following points should be covered in your orientation but you may modify or add to the orientation anything necessary for your local situation.)

Purpose. The purpose of this program is to be sure that all crewmembers can do the individual tasks that are needed in the Crew Drills. There are four sets of exercises--for the TC, gunner, loader and driver. After this orientation you will take the TC test. You will then be responsible to administer the other tests to your gunner, loader and driver.

Although the exercises are in the format of tests and are called tests, we are using them as training exercises to identify and correct any weaknesses in basic skills before we go into Crew Drills. At the end everyone should be certified on all the tasks for his crew position.

The tasks that you will evaluate and also that you will be evaluated on are basic tasks directly connected with gunnery. Since most crewmen will be able to perform these tasks the first time around, they should not take much time to administer. But if any crewmen cannot meet these minimal qualifications, we want to get him up to speed before we start Crew Drill practice.

Administration. The tests are designed to be administered at almost any time in almost any location. (Include any information on where the TC should administer the test and the deadline for completing the evaluations.) Now I will briefly cover the steps in administering the tests. I will refer to portions of your test so keep it handy.

You have three separate test sections--one for the gunner, one for the loader and one for the driver. On the first page of each section is a part titled "TANK COMMANDER INSTRUCTIONS." This gives you overall information that applies to all or most of the tests for the crew position. It lists the tasks that will be tested, the conditions needed for the tests, any equipment you will need, general administration rules, and the steps to set up for the tests.

Each crew position has at least two tests. Normally you will conduct all the tests for a crew position one right after the other. However, you may also administer the tests independently if you have to.

Each test has a section headed "HOW TO TEST THIS TASK." This section normally has three subsections. The first is "Setting Up the Test." This tells you what you must do to get ready for the particular test. The second subsection is "Administering the Test." This tells you any information you need to administer the test including any task steps that you must perform, where you should position yourself, or any other special instructions. The third subsection is called "Instructions To the Crewmember--Gunner, Driver or Loader." It includes what you should have

the crewmember do before the test and what you should tell him to start the test. What you tell the crewmember is printed in bold type. You do not have to say the exact words but it is recommended that you do because they contain all the information that the crewmember needs. Unlike other tests you may have given or taken, you can answer any questions the crewmember may have about what he is supposed to do.

The next section is titled "HOW TO SCORE THIS TEST" and this section is used in conjunction with the scoresheet which follows it. On the scoresheet are listed certain performance measures or "PM" as they are called. Many of these PM are self explanatory but some need instructions on what to look for or how to evaluate them. The "HOW TO SCORE THIS TEST" section gives you this additional information. Be sure to read this section before you administer the test.

Now let's look at the scoresheets themselves. As I said, on each scoresheet is a list of performance measures which are characteristics you should consider when you evaluate performance. In most cases these performance measures are not very detailed; that is, they only list the minimum steps that must be done or the acceptable products to show the task was performed correctly. The PM allow individual differences in how the task is performed as long as the main steps or end result is achieved.

When you administer the test, watch the crewmember perform the task, then mark the results on the scoresheet. Most of these tasks go too fast for you to mark each PM as it occurs. You should read and be familiar with the PM before the test. Then you can watch the crewman and not the scoresheet during the performance. We will discuss certification in detail in a moment but you should remember that in scoring you are not restricted to only the PM listed. You can and should use your knowledge of the task to supplement the listed PM. On each scoresheet a place is provided for you to write any reason that you decide not to certify. For example, in the test on Load the Main Gun, the loader should form his hand into a fist and push the round into the chamber with the heel of his hand. Yet this is not listed as a performance measure because we anticipate that all loaders will chamber the round correctly. But if your loader chambers the round incorrectly, write that as a reason, correct him, and retest him.

Remediation. Since the purpose of these tests is to correct weaknesses, remediation is a vital part of these tests. To be effective, remediation should come immediately after the incorrect performance and focus on the part of the task the crewmember failed. In some cases, you will be wise to give remedial training on the complete task. But in most cases your training will be most effective if you retrain only the one or two steps the crewman had trouble with. To help you decide whether to retrain on the whole task or just on some steps, some scoresheets will suggest a criterion for whole task training--for example, "Retrain the whole task if the crewman misses 3 PM."

The standard remediation process, for steps or tasks, can have seven steps:

. First - Tell the crewmember what he omitted or did wrong.

. Second - Have him perform that step or steps while you watch.

. Third - If he cannot do the steps, have him watch you do it.

. Fourth - Have him do the steps while you watch.

. Fifth - Have him put all the steps together.

. Sixth - Have him practice while you watch.

. Seventh - Retest.

These steps are also outlined in the front of your small Remediation Booklet.

Most tasks have some steps that require diagnosis of performance to find the source of the problem or steps that can be trained most effectively by modifying the standard remediation process. Both kinds of steps are indicated by a color-coded block on the NO-GO line. If you mark one of these steps NO-GO, go to the small Remediation Booklet, turn to the section for the crew position, open to the page that matches the color code and task number, and you will find special remediation instructions for the step.

The recommended standard remediation process and the special remediation guidance are intended to assist you, not replace your expertise. To train effectively you must still draw on your knowledge of gunnery procedures and of your crewmen.

If you give remedial training on a task or on part of a task, you must retest on the entire task. You will notice that there is space on the scoresheet for giving the test three times. If you need more scoresheets, see me. If you find a problem with a crewman's performance, you should do everything you can to get it straightened out immediately on the tank at the site we have set up. You may need to back off and give him some basic information on the task. Some of the tests suggest specific TEC lessons that can assist you on this. But get the crewman back on the tank for practice and retesting as quickly as possible.

Certification. Which brings us to certification. Remember you do not report NO-GOs--you correct NO-GOs and only report when a crewmember is ready to perform to the level we expect in this platoon. When you certify the crewmember on a task, you are telling me, and I am telling the company commander, that you are satisfied that the crewmember is ready to meet your standards of performance on the tasks--not merely the performance measures listed on the scoresheet. Even if a crewmember gets a GO on all performance measures but you feel he may not be able to do the task during Crew Drills, you should test him again to make sure. You make the final determination whether the crewmember is ready

on the task or not. For this reason do not think that the goal is to get everyone certified by whatever means possible and forget about it. There is nothing to be gained by certifying a crewmember if you think he cannot do the task. If you certify someone who needs training, you will surely have problems during the Crew Drills which will follow.

Finally, I want to emphasize your importance in this program. You are a tester, a trainer, and a training manager. These materials will help you in all three roles if you read them. Make sure you understand each part of the test and follow the instructions. If you have any problems in understanding the material, administering the test, or remediating the test, bring them to me or the platoon sergeant.

PLATOON LEADER/PLATOON SERGEANT INSTRUCTIONS FOR TANK COMMANDER'S TEST

1. The tasks and locations for the TC's test are shown below:

TEST #	TASK TITLE	TEST LOCATION
1	Load, Engage & Clear the Caliber .50 MG	Anywhere there is a tank
2	Engage Targets	Anywhere there is room to maneuver the turret and you can select objects to be targets at 500-2000 meters
3	Acquire Targets Using the TIS	
4	Monitor Engagements	
5	Track Targets	
6	Monitor Lasing	LRF range
7	Round Sense	BOT simulator

2. For Test 1, the caliber .50 machinegun must be installed following the procedure in A through C, page 2-102 of DEP 9-2350-255-10-1.

3. For Tests 2 through 6, make sure the tank is prepared as follows:

   a. Follow the procedures on page 2-96; pages 2-114 through 2-141; and page 2-190 and 2-191 of DEP 9-2350-255-10-1.

   b. Except for the task, "Monitor Lasing," the LRF must remain in SAFE.

   c. Monitor the condition of the batteries periodically during the tests. If the LOW BAT CHARGE caution light comes on, run the engine at tactical idle until the light extinguishes.

4. You must obtain the following equipment:

   . One box of dummy .50 caliber ammunition (for Task 1)

   . Tape or other material to cover the TC unity windows (for Task 3)

   . A BOT/COFT simulator or a scale graphic training aid of a tank on a battlefield setting (for Task 7).

   . A stopwatch would be helpful for all tests, but is not required.

5. The TC is allowed to use his binoculars during target engagement tasks whenever the TC hatch is open.

6. Conduct the tests in the sequence listed.

7. Read the sections titled "HOW TO TEST THIS TASK" and "HOW TO SCORE THIS TEST" before you conduct each test.

TANK COMMANDER'S TEST 1: LOAD, ENGAGE AND CLEAR THE CALIBER .50 MACHINEGUN

HOW TO TEST THIS TASK

Setting Up the Test

1. Pick out a target (such as a panel) at about 500 meters.
2. Point the machinegun approximately 90° away from the target.
3. Place the box of dummy ammunition on top of the turret.
4. Place the machinegun safety in FIRE.
5. Turn TURRET POWER switch ON.
6. Turn AUX HYDR POWER switch ON.
7. Close the loader's hatch.

Administering the Test

8. Position yourself on top of the turret where you can observe the TC actions. The machinegun must be correctly loaded before engaging and clearing. If the TC does not load correctly you must either remediate or load it correctly yourself before you can continue testing.

Instructions To the TC

9. Position the TC in the TC hatch. Allow him to adjust the intermediate platform for standing open hatch operation.

10. Tell the TC: "IN THIS TEST YOU MUST LOAD, ENGAGE A TARGET AND CLEAR THE CALIBER FIFTY MACHINEGUN. AFTER YOU LOAD I WILL POINT OUT YOUR TARGET. DO NOT CLEAR UNTIL I TELL YOU TO." Pause. "LOAD." After the TC has successfully loaded the weapon, tell him, "ENGAGE THAT (TARGET)." (Indicate target.) After engaging tell him, "CLEAR THE WEAPON."

HOW TO SCORE THIS TEST

1. To score PM 1g, "Complete Loading in 60 Seconds," begin timing when you announce "LOAD" and stop timing when the weapon is charged.

2. To receive a GO on PM 2a, "Lay on Target," the weapon must be pointed in the general direction of the target.

3. To receive a GO on PM 2b, "Sight on Target," the TC must look through the commander's weapon periscope.

4. To receive a GO on PM 3e, "Pull and Hold Charger To the Rear," the TC must hold the charger to the rear momentarily to check if the chamber is clear of ammunition. This can be a visual check; he does not have to feel in the chamber.

SCORESHEET: LOAD, ENGAGE AND CLEAR THE CALIBER .50 MACHINEGUN

TC NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test		Retest-1		Retest-2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO
1. Loading						
a. Set safety to SAFE.	___	___	___	___	___	___
b. Attach ammo box.	___	___	___	___	___	___
c. Lay first round in receiver under extractor.	___	___	___	___	___	___
d. Close cover.	___	___	___	___	___	___
e. Set safety to FIRE.	___	___	___	___	___	___
f. Pull charger to the rear.	___	___	___	___	___	___
g. Complete loading in 60 seconds.	___	___	___	___	___	___
2. Engage Target						
a. Lay on target.	___	___	___	___	___	___
b. Sight on target.	___	___	___	___	___	___
c. Fire weapon.	___	___	___	___	___	___
3. Clear Machinegun						
a. Set machinegun safety to SAFE.	___	___	___	___	___	___
b. Lift extractor from ammunition belt.	___	___	___	___	___	___
c. Remove ammunition belt from receiver.	___	___	___	___	___	___
d. Set safety to FIRE.	___	___	___	___	___	___
e. Pull and hold charger to the rear.	___	___	___	___	___	___
f. Release charger.	___	___	___	___	___	___
g. Close cover.	___	___	___	___	___	___
h. Press butterfly trigger.	___	___	___	___	___	___

REMARKS: Other deficiencies or reasons for not certifying: _____

_____

_____

The TC must receive a GO on all Performance Measures before you certify. ☐

I CERTIFY ON: _____ BY: _____

(Date) (Name)

TANK COMMANDER'S TEST 2: ENGAGE TARGETS

HOW TO TEST THIS TASK

Setting Up the Test

1. This task may be conducted anywhere there is room to maneuver the turret and three targets can be distinctly identified. The targets will simulate a stationary tank target, a moving tank target and a coax target. The targets should be at ranges from 500 to 2000 meters. Actual targets can be tanks, panels, silhouettes, and the moving target can be military or civilian traffic.

   (NOTE: The LRF will <u>not</u> be used under the above conditions.)

2. Insure the steps in paragraph 3 of the PLATOON LEADER'S INSTRUCTIONS have been done.

3. Determine the range to each of the targets and write it down.

4. Select a reference point that is outside of the target area. You must return to this reference point after each engagement.

Administering the Test

5. You will administer and score the test from the gunner's seat and act as the gunner. Announce "IDENTIFIED" as soon as you have identified the target. Index the ammunition as announced in the fire command. Lay and track as accurately as possible. Simulate firing the round and continue to fire until the TC announces "CEASE FIRE" or until you have fired the second round. If the TC does not announce "CEASE FIRE" after the second round, you should terminate the exercise. You may repeat the target identification to the TC before each exercise.

Instructions To the TC

6. Position the TC in the TC position. Have the TC adjust his seat, platform, position and optics as necessary.

7. Tell the TC: "THIS TEST CONSISTS OF THREE ENGAGEMENTS. THEY ARE A STATIONARY TANK, A MOVING TANK AND A COAX TARGET. THE LRF IS INOPERATIVE. YOU MUST ANNOUNCE THE RANGE TO ME AS PART OF YOUR FIRE COMMAND. YOU MUST ENGAGE EACH TARGET AS I ANNOUNCE THEM. THE LOADER'S ACTIONS ARE SIMULATED AND YOU WILL ASSUME THAT 'UP' HAS BEEN ANNOUNCED. I WILL ACT AS YOUR GUNNER." Pause. Announce "STATIONARY TANK - BEGIN."

HOW TO SCORE THIS TEST

1. To receive a GO on PM 1, 5 and 9, "Layed Gun on Target," TC must lay the gun so the target remains in the gunner's reticle. The gunner's reticle must not overshoot the target.

2. To receive a GO on PM 2, 6 and 10, "Issued (Target) Fire Command," the TC must announce the proper fire command for each target. The Description Element must match the target. The Ammunition Element must be APDS or HEAT for the tank targets and COAX for the COAX target. He must announce "FIRE" and must announce "CEASE FIRE."

3. To receive a GO on PM 3, 7 and 11, "Announced Range To Target," TC must announce a range that is within 200 meters of the predetermined range.

   (NOTE: If either main gun target is within battlerange the TC may use battlerange. Coax battlerange should be used for the COAX target. However, the TC must still announce the range. If he fails to announce range, you should ask for it after the engagement.)

4. To score GO on PM 4, 8 and 12, "Completed Lay Within 10 Seconds," start timing when the TC announces "GUNNER" or when the turret starts to move, whichever occurs first. Stop timing when you can announce "IDENTIFIED." You may use a stopwatch or you can estimate the time accurately by counting (one thousand one . . .).

SCORESHEET: ENGAGE TARGETS

TC NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test GO	Initial Test NO-GO	Retest-1 GO	Retest-1 NO-GO	Retest-2 GO	Retest-2 NO-GO
A. Stationary Tank Target						
1. Layed gun on target.	___	☐	___	☐	___	☐
2. Issued tank target fire command.	___	☐	___	☐	___	☐
3. Announced range to target.	___	☐	___	☐	___	☐
4. Completed lay within 10 seconds.	___	☐	___	☐	___	☐
B. Moving Tank Target						
5. Layed gun on target.	___	☐	___	☐	___	☐
6. Issued moving tank target fire command.	___	☐	___	☐	___	☐
7. Announced range to target.	___	☐	___	☐	___	☐
8. Completed lay within 10 seconds.	___	☐	___	☐	___	☐
C. COAX Target						
9. Layed gun on target.	___	☐	___	☐	___	☐
10. Issued coax target fire command.	___	☐	___	☐	___	☐
11. Announced range to target.	___	☐	___	☐	___	☐
12. Completed lay within 10 seconds.	___	☐	___	☐	___	☐

REMARKS: Other deficiencies or reasons for not certifying: _____

The TC must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____

(Date) (Name)

TANK COMMANDER'S TEST 3: ACQUIRE TARGETS USING THE TIS

HOW TO TEST THIS TASK

Setting Up the Test

1. This test can be conducted anywhere there is room to maneuver the turret and three targets can be identified. The targets must be distinctive; that is, they should be distinguishable from other thermal image producing objects. The targets can be stationary or moving and should vary from targets in the open to targets obscured by foliage or partially concealed. Targets should be located between 800-2000 meters.

   (NOTE: The LRF will <u>not</u> be used under the above conditions.)

2. Insure the steps in paragraph 3 of the PLATOON LEADER'S INSTRUCTIONS have been done.

3. Determine the actual range to the targets and write it down.

4. Tape or cover the commander's unity periscopes.

5. Place the TIS into operation.

6. Position the gun tube so that the targets are outside the TIS field of view.

Administering the Test

6. You will administer and score the test from the gunner's seat and act as the gunner. During the test the TC will be required to identify and lay on all three targets by issuing a fire command. You will act as the gunner and engage the targets correctly. The TC will proceed to each engagement without halting between engagements. After the TC has engaged the third target you may terminate the exercise.

Instructions To the TC

7. Position the TC in the TC position. Have him adjust the seat, platform, and optics as necessary.

8. Direct the TC to close and lock the TC hatch cover.

9. Tell the TC: "DURING THIS TEST YOU WILL ENGAGE THREE MAIN GUN TARGETS USING THE TIS. YOUR TARGETS ARE (describe the targets). WE WILL SIMULATE AN LRF FAILURE. YOU MUST ANNOUNCE THE RANGE TO EACH TARGET AS PART OF THE FIRE COMMAND. EACH TARGET WILL BE ENGAGED WITH A SINGLE ROUND. DO NOT WAIT BETWEEN ENGAGEMENTS. AS SOON AS ONE ENGAGEMENT HAS BEEN COMPLETED GO RIGHT ON TO THE NEXT. I WILL ACT AS YOUR GUNNER. THE LOADER WILL BE SIMULATED AND YOU WILL ASSUME THAT 'UP' HAS BEEN PROPERLY ANNOUNCED." Pause. "BEGIN."

HOW TO SCORE THIS TEST

1. To receive a GO on PM 1, 2 and 3, "Announced Range To Target (Number)," the TC must announce a range that is within 200 meters of the actual range. You may ask him for the range if he fails to announce it. The TC may also use the battlerange button but he still must announce the range.

2. The time indicated in PM 4, "Completed All Engagements Within 2 Minutes," is considered a normal time to search the battlefield and engage main gun targets with 1 round each. You may adjust this time based on your target presentation and local conditions.

3. There are other aspects of the engagements such as proper fire commands by the TC, laying on the targets and monitoring of the engagements which are not listed on the scoresheet. Although specifically tested elsewhere, these should not be ignored during this test. If the TC fails to follow all required procedures, note them in the REMARKS section, withhold certification, correct them and retest.

SCORESHEET: ACQUIRE TARGETS USING THE TIS

TC NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test		Retest-1		Retest-2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO
1. Announced range to Target 1.	___	☐	___	☐	___	☐
2. Announced range to Target 2.	___	☐	___	☐	___	☐
3. Announced range to Target 3.	___	☐	___	☐	___	☐
4. Completed all engagements in 2 minutes.	___	☐	___	☐	___	☐

REMARKS: Other deficiencies or reasons for not certifying: _____

_____

_____

The TC must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____

(Date) (Name)

TANK COMMANDER'S TEST 4: MONITOR ENGAGEMENTS

HOW TO TEST THIS TASK

Setting Up the Test

1. This task may be conducted anywhere there is room to maneuver the turret and three targets can be identified. One of the targets must be a moving target. Targets should be at a range of approximately 1600 meters and can be tanks, panels or other vehicles. The moving target can be civilian or military traffic.

   (NOTE: The LRF will not be used under the above conditions.)

2. Insure the steps in paragraph 3 of the PLATOON LEADER'S INSTRUCTIONS have been done.

Administering the Test

3. You will score the test while acting as the gunner. Each target will be engaged with two rounds. During each round engagement you will elect to do one of the following:
   a. Take up an incorrect battlesight picture.
   b. Take up an incorrect track.
   c. Take up a correct sight picture.
   d. Take up a correct track.

   Vary what you do so the TC does not know what to expect.

Instructions To the TC

4. Position the TC in the commander's hatch. Have the TC adjust his seat, platform and optics as necessary.

5. Tell the TC: "DURING THIS TEST YOU WILL ENGAGE THREE TARGETS. (Identify the targets.) I WILL ACT AS YOUR GUNNER. EACH TARGET WILL BE ENGAGED WITH TWO ROUNDS BATTLESIGHT. IF I DO ANYTHING WRONG, YOU MUST CORRECT ME BEFORE THE ROUND IS FIRED. ASSUME THAT 'UP' HAS BEEN ANNOUNCED." Pause. "BEGIN."

HOW TO SCORE THIS TEST

1. To receive a GO on PM 1, 2 and 3, "Corrected Wrong Sight Picture or Track," the TC must make you correct any wrong actions. He may tell you to lay on base of target or not to lead, or he may tell you to adjust in mils. He may use the override and correct the lay himself or he may issue a CEASE FIRE and have you take up a correct lay. He must take whatever action before you announce "ON THE WAY."

2. To receive a GO on PM 4, "Corrected Only Wrong Actions," the TC must not issue a correction whenever you have performed correctly.

3. There are other aspects of the engagements such as proper battlesight fire commands by the TC and laying the gun for direction which are not listed on the scoresheet. Although specifically tested elsewhere, these should not be ignored during this test. If the TC fails to follow all required procedures, note them in the REMARKS section, withhold certification, correct them and retest.

SCORESHEET: MONITOR ENGAGEMENTS

TC NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test		Retest-1		Retest-2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO
1. Corrected wrong sight picture (stationary Target 1).	___	☐	___	☐	___	☐
2. Corrected wrong sight picture (stationary Target 2).	___	☐	___	☐	___	☐
3. Corrected wrong track.	___	☐	___	☐	___	☐
4. Corrected only wrong actions.	___	☐	___	☐	___	☐

REMARKS: Other deficiencies or reasons for not certifying: _____

_____

_____

The TC must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____

(Date) (Name)

TANK COMMANDER'S TEST 5: TRACK TARGETS

HOW TO TEST THIS TASK

Setting Up the Test

1. This test may be conducted anywhere there is room to maneuver the turret and two simulated moving tank targets can be identified. The simulated tank targets can be military or civilian targets located at approximately 1600 meters and moving at speeds of 25 mph or less.

   (NOTE: The LRF will not be used under the above conditions.)

2. Insure the steps in paragraph 3 of the PLATOON LEADER'S INSTRUCTIONS have been done.

Administering the Test

3. You will administer and score the test from the gunner's seat. The TC will acquire and engage from his position two moving targets that he selects.

Instructions To the TC

4. Position the TC in the TC position. Have him adjust the seat, platform and optics as necessary.

5. Tell the TC: "DURING THIS TEST YOU WILL ENGAGE TWO MOVING TARGETS WITH TWO ROUNDS EACH. YOU MAY SELECT WHICH TARGETS TO ENGAGE. YOU WILL ENGAGE THE TARGETS YOURSELF. SIMULATE THAT THE GUNNER IS ABSENT. YOU WILL ALSO SIMULATE THE LOADER'S ACTIONS AND ASSUME THAT 'UP' HAS BEEN ANNOUNCED. ALL ENGAGEMENTS WILL BE BATTLESIGHT."

HOW TO SCORE THIS TEST

1. To receive a GO on PM 1 and 3, "Tracked Target (Number)," the TC must lay on the center base of the target and maintain that sight picture until the second round has been fired.

2. To score PM 2 and 4, "Completed Engagement Within 20 Seconds," start timing when the TC announces "FROM MY POSITION" or when he starts to lay the gun, and stop timing when he announces "TARGET CEASE FIRE." You may use a stopwatch or estimate the time accurately by counting (one thousand one . . .).

3. There are other aspects of the engagements such as proper fire commands by the TC and firing procedures which are not listed on the score-sheet. Although not specifically part of this test, these should not be ignored during this test. If the TC fails to follow all required procedures, note them in the REMARKS section, withhold certification, correct them and retest.

SCORESHEET: TRACK TARGETS

TC NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test		Retest-1		Retest-2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO
1. Tracked Target 1.	___	☐	___	☐	___	☐
2. Completed engagement within 20 seconds.	___	☐	___	☐	___	☐
3. Tracked Target 2.	___	☐	___	☐	___	☐
4. Completed engagement within 20 seconds.	___	☐	___	☐	___	☐

REMARKS: Other deficiencies or reasons for not certifying: _____

_____

_____

The T[illegible] v[illegible] a GO on all Performance Measures before you certify.

I CER[illegible] BY: _____

(Date) (Name)

TANK COMMANDER'S TEST 6: MONITOR LASING

HOW TO TEST THIS TASK

Setting Up the Test

1. This task must be conducted on a laser range or other area that has been designated for employment of the LRF. A minimum of three laser targets at ranges from 800 to 2500 meters simulating tanks should be used. All precautions for employing the LRF as outlined in DEP 9-2350-10-1 and unit SOP must be observed.
2. Insure the steps in paragraph 3 of the PLATOON LEADER'S INSTRUCTIONS have been done.
3. Determine the ranges to the three targets and write them down.

Administering the Test

4. You will administer and score the test from the gunner's position while acting as the gunner. During ranging you must vary the point of aim to try to obtain a Multiple Return Bar indicator. This may be done by selecting targets at far ranges, those that are partially obscured or manipulating the FIRST RETURN/LAST RETURN lever. You may also obtain a correct range on any of the targets.

Instructions To the TC

5. Position the TC in the TC location. Have him adjust his platform, seat and optics as necessary. Have him close and lock his hatch.
6. Tell the TC: "DURING THIS TEST YOU MUST ENGAGE THREE TARGETS. (Identify the targets by pointing them out on the ground.) ALL TARGETS WILL BE ENGAGED WITH ONE ROUND USING THE LRF. I WILL ACT AS YOUR GUNNER. I WILL ONLY MAKE RANGE CORRECTIONS AS YOU TELL ME TO. THE ACTIONS OF THE LOADER WILL BE SIMULATED AND YOU WILL ASSUME THAT 'UP' HAS BEEN ANNOUNCED." Pause. "BEGIN."

HOW TO SCORE THE TEST

1. To score on PM 1, 2 and 3, "Issued Correct Instructions on Target (Number)," will depend on what the LRF return was:
   a. If the LRF return was correct and the TC did nothing, mark the PM GO.
   b. If the LRF return was correct and the TC directs you rerange, mark the PM NO-GO.
   c. If the LRF return was incorrect and the TC directs you rerange, mark the PM GO.
   d. If the LRF return was incorrect and the TC says nothing, mark the PM NO-GO.
2. There are other aspects of the engagements such as proper fire commands by the TC and laying on the targets which are not listed on the score-sheet. Although specifically tested elsewhere these should not be ignored during this test. If the TC fails to follow all required procedures, note them in the REMARKS section, withhold certification, correct them and retest.

SCORESHEET: MONITOR LASING

TC NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test		Retest-1		Retest-2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO
1. Issued correct instructions Target 1.	___	☐	___	☐	___	☐
2. Issued correct instructions Target 2.	___	☐	___	☐	___	☐
3. Issued correct instructions Target 3.	___	☐	___	☐	___	☐

REMARKS: Other deficiencies or reasons for not certifying: _____

_____

_____

The TC must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____
(Date) (Name)

TANK COMMANDER'S TEST 7: ROUND SENSE

HOW TO TEST THIS TASK

Setting Up the Test

1. This task is tested on a conduct of fire trainer, BOT trainer or other similar training device that allows the strike of the round to be simulated. If a simulator is not available this task can be tested by using a scale drawing of a tank and pointing to the simulated strike of the round for a one-second period.

Administering the Test

2. You will present the TC a total of seven sensings as follows:

Deflection	Range
Left	Doubtful
Right	Over
Line	Target
	Short

These may be presented in any combination of deflection and range sensings.

Instruction To the TC

3. Seat the TC at the trainer (or have him stand in front of the drawings at a distance that is proportional to the size of the enemy tank depicted.)

4. Tell the TC: "DURING THIS TEST I WILL PRESENT YOU WITH A SERIES OF ROUNDS. I WILL ANNOUNCE 'ON THE WAY' BEFORE EACH ROUND. YOU MUST ANNOUNCE YOUR SENSING TO ME WITHIN THREE SECONDS AFTER THE ROUND APPEARS ON THE TRAINER. YOU DO NOT HAVE TO RELAY OR OTHERWISE MANIPULATE THE TRAINER CONTROLS." Pause. Announce "ON THE WAY" First Round.

HOW TO SCORE THIS TEST

To score PM 8, "Announced Sensing Within 3 Seconds," start timing when the round appears on the trainer and stop timing when the TC has completed his sensing announcement. You may use a stopwatch or you can estimate the time accurately by counting (one thousand one . . .).

SCORESHEET: ROUND SENSE

TC NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test		Retest-1		Retest-2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO
1. Sensed LEFT.	___	☐	___	☐	___	☐
2. Sensed RIGHT.	___	☐	___	☐	___	☐
3. Sensed LINE.	___	☐	___	☐	___	☐
4. Sensed OVER.	___	☐	___	☐	___	☐
5. Sensed SHORT.	___	☐	___	☐	___	☐
6. Sensed DOUBTFUL.	___	☐	___	☐	___	☐
7. Sensed TARGET.	___	☐	___	☐	___	☐
8. Announced each sensing within 3 seconds.	___	☐	___	■	___	■

REMARKS: _____

_____ _____

_____

The TC must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____

(Date) (Name)

TANK COMMANDER INSTRUCTIONS FOR GUNNER'S TEST

1. The tasks and locations for the gunner's test are shown below:

TEST #	TASK TITLE	TEST LOCATION
1	Load/Clear the Coax Machinegun	Anywhere there is a tank
2	Prepare for Main Gun Firing	Anywhere there is room to maneuver the turret and you can select objects to be targets at ranges of 500 to 2000 meters
3	Engage Targets - Battlesight	
4	Identify Targets Using the TIS	
5	Apply Target Leads	
6	Apply Target Form	
7	Engage Targets - Precision	Laser range
8	Apply BOT	BOT simulator

2. For Test 1 the coax machinegun must be installed following the procedure on page 2-151 of DEP 9-2350-255-10-1.

3. For Tests 2 through 7 make sure the tank is prepared as follows:

   a. Complete the procedure on page 2-96; pages 2-114 through 2-141; and pages 2-190 and 2-191 of DEP 9-2350-255-10-1.

   b. Except for the task,"Engage Targets - Precision," the LRF must remain in SAFE.

   c. Insert the firing circuit tester in the breech for Tests 3-7.

   d. Monitor the condition of the batteries periodically during the tests. If the LOW BAT CHARGE caution light comes on, run the engine at tactical idle until the light extinguishes.

4. The only additional equipment you will need for these tests is a belt (a minimum of 10 rounds) of linked, dummy coax ammunition and the firing circuit tester. A stopwatch would be helpful but is not absolutely required.

5. Conduct tests in the sequence listed. The gunner may have to exit the tank while you set up the conditions for the next test.

6. Read the sections titled, "HOW TO TEST THIS TASK," and "HOW TO SCORE THIS TEST," before you conduct each test.

GUNNER TEST 1: LOAD/CLEAR THE COAX MACHINEGUN

HOW TO TEST THIS TASK

Setting Up the Test

1. Place GUN SELECT switch in COAX.

2. Place GUN/TURRET DRIVE switch to EL UNCPL.

3. Place trigger safety on machinegun on F (Fire).

4. Close cover on machinegun.

5. Place a belt (minimum of 10 rounds) of dummy ammunition on the top of the main gun.

Administering the Test

6. After the gunner has completed loading the machinegun, AND IF THE MACHINEGUN IS CORRECTLY LOADED, tell him, "YOU MUST NOW CLEAR THE COAX." If the gunner does not load the coax correctly, you must either remediate loading and have him perform correctly or load the coax correctly yourself before you can test him on clearing.

Instructions To the Gunner

7. Have the gunner position himself in the gunner's seat.

8. Tell the gunner: "YOU MUST FIRST LOAD, THEN CLEAR THE COAX MACHINEGUN. DO NOT START TO CLEAR UNTIL I TELL YOU TO." (Pause) "BEGIN."

HOW TO SCORE THIS TEST

1. To receive a GO on PM 1c, "Feed Belt Through Chute," the open side of the links must be down.

2. To receive a GO on PM 2i, "Allow Bolt To Close Slowly," the gunner must pull the charger handle to the rear and pull the trigger while keeping tension on the charger handle while the bolt is moving forward. If the gunner allows the bolt to go forward unrestricted, mark PM 2i NO-GO.

SCORESHEET: LOAD/CLEAR THE COAX MACHINEGUN

GUNNER'S NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test		Retest-1		Retest-2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO
1. Loading						
a. Place GUN SELECT switch on TRIGGER SAFE.	___	___	___	___	___	___
b. Place machinegun safety on S.	___	___	___	___	___	___
c. Feed belt through chute.	___	___	___	___	___	___
d. Place safety on F.	___	___	___	___	___	___
e. Pull charger cable to rear.	___	___	___	___	___	___
f. Place machinegun safety on S.	___	___	___	___	___	___
g. Raise feed tray.	___	___	___	___	___	___
h. Close feed tray.	___	___	___	___	___	___
i. Place belt in tray.	___	___	___	___	___	___
j. Close cover.	___	___	___	___	___	___
2. Clearing						
a. Place safety to F.	___	___	___	___	___	___
b. Pull charger handle to rear.	___	___	___	___	___	___
c. Place safety to S.	___	___	___	___	___	___
d. Open cover.	___	___	___	___	___	___
e. Remove ammunition belt.	___	___	___	___	___	___
f. Lift feed tray.	___	___	___	___	___	___
g. Close cover.	___	___	___	___	___	___
h. Place safety to F.	___	___	___	___	___	___
i. Allow bolt to close slowly.	___	___	___	___	___	___

REMARKS: Other deficiencies or reasons for not certifying: _____

_____

_____

The gunner must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____

(Date) (Name)

TIME TARGET FOR LOADING: 40 seconds ☐

TIME TARGET FOR CLEARING: 50 seconds ☐

Retrain all of loading if the gunner gets a NO-GO on 3 or more PM. ☐

Retrain all of clearing if the gunner gets a NO-GO on 3 or more PM. ☐

GUNNER TEST 2: PREPARE FOR MAIN GUN FIRING

HOW TO TEST THIS TASK

Setting Up the Test

1. Insure the steps in paragraph 3 of the TANK COMMANDER INSTRUCTIONS have been done.

2. Place the GUN SELECT switch in either the center (TRIGGER SAFE) or COAX position.

3. Place the AMMUNITION SELECT switch in either the HEP, BH or HEAT position.

4. Place the FIRE CONTROL MODE switch in MANUAL.

5. Place the magnification lever in the 3X position.

Instructions To the Gunner

6. Position the gunner in the gunner's seat. Allow him to adjust his position as necessary but do not allow him to touch any of the controls.

7. Tell the gunner: "THE PRE-OPERATION CHECKS HAVE BEEN CONDUCTED. YOU MUST REACT TO THE FIRE COMMAND." (Pause - announce, "GUNNER, BATTLESIGHT, SABOT, TANK.")

HOW TO SCORE THIS TEST

1. To receive a GO on PM 1, the gunner must look through the GPS while traversing the turret. If the gunner has his head to the GPS and the turret is moving at all, mark PM 1 GO.

2. After you score PM 1, announce, "CEASE FIRE." Without allowing him to touch any controls, have the gunner position himself so that you can see the controls indicated on the scoresheet and score the remainder of the PM.

SCORESHEET: PREPARE FOR MAIN GUN FIRING

GUNNER'S NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test		Retest-1		Retest-2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO
1. Traversed the turret looking for target.	___	___	___	___	___	___
2. FIRE CONTROL MODE switch in NORMAL.	___	___	___	___	___	___
3. GUN SELECT switch in MAIN.	___	___	___	___	___	___
4. AMMUNITION SELECT switch in APDS.	___	___	___	___	___	___
5. Magnification lever in 10X.	___	___	___	___	___	___

REMARKS: Other deficiencies or reasons for not certifying: _____

_____

_____

The gunner must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____

(Date) (Name)

TIME TARGET: 40 seconds

Retrain all of the task if the gunner gets a NO-GO on 3 or more PM. ☐

GUNNER TEST 3: ENGAGE TARGETS - BATTLESIGHT

HOW TO TEST THIS TASK

Setting Up the Test

1. This test may be conducted anywhere there is room to maneuver the turret and six simulated tank targets (3 stationary, 3 moving) can be identified. The targets should be as close to 1600 meters as possible. The stationary targets can be tanks or panels. The moving targets can be military or civilian traffic moving at speeds of 25 mph or less.

   (NOTE: It is important that the rangefinder <u>not</u> be used under the above conditions.

2. Insure the steps in paragraph 3 of the TANK COMMANDER INSTRUCTIONS have been done.

Administering the Test

3. During the test you will issue a battlesight fire command for each target that is appropriate for that target. If actual targets are not tanks, instruct the gunner before the test that all targets will simulate tanks. The gun should be off the target at the start of the fire command so that the target is not in the gunner's sight. Lay the gun as you would for an actual engagement. You may select the targets in any sequence you choose. Announce CEASE FIRE and pause long enough between each exercise so that each target is treated as a new engagement.

Instructions To the Gunner

4. Have the gunner position himself in the gunner's seat and have him adjust the seat, controls and sights as necessary.

5. Tell the gunner, "I WILL ISSUE A BATTLESIGHT FIRE COMMAND AND LAY YOU ON SEVERAL TARGETS. YOU WILL NOT RANGE TO THE TARGET." Pause. Issue your first fire command.

HOW TO SCORE THIS TEST

1. To score PM 2 and PM 5, "Announced ON THE WAY Within 10 Seconds," start timing from the end of your fire command and stop timing when the gunner announces ON THE WAY. You may use a stopwatch or you can estimate the time accurately by counting (one thousand one . . .).

2. To receive a GO on PM 6, "Maintained Smooth Track Before Firing," the gunner must not adjust his track during the 1.5 seconds before firing. You need only estimate this time but there must be a definite period of smooth track before firing.

3. To receive a GO on PM 8, "Continued Tracking After Firing," the gunner must continue to lay on the center base of target until you announce CEASE FIRE or the target passes from view.

SCORESHEET: ENGAGE TARGETS - BATTLESIGHT

GUNNER'S NAME _____

TANK NUMBER _____

STATIONARY TARGETS

PERFORMANCE MEASURES	TARGET 1						TARGET 2						TARGET 3					
	Init Test		Retest 1		Retest 2		Init Test		Retest 1		Retest 2		Init Test		Retest 1		Retest 2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO
1. Announced IDENTIFIED.	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐
2. Announced ON THE WAY within 10 seconds.	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐
3. Fired at center base of target	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐

MOVING TARGETS

	TARGET 1						TARGET 2						TARGET 3					
	Init Test		Retest 1		Retest 2		Init Test		Retest 1		Retest 2		Init Test		Retest 1		Retest 2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO
4. Announced IDENTIFIED.	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐
5. Announced ON THE WAY within 10 seconds.	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐
6. Maintained a smooth track bef re firing.	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐
7. Fired at center base of target.	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐
8. Continued tracking after firing.	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐	___	☐

REMARKS: Other deficiencies or reasons for not certifying: _____

The gunner must receive a GO on all PM before you certify.

I CERTIFY ON: _____ BY: _____

(Date) (Name)

Retrain and retest on 3 like targets (stationary or moving) if gunner fails 2 or more PM in 2 or more like engagements.

GUNNER TEST 4: IDENTIFY TARGETS USING THE TIS

HOW TO TEST THIS TASK

Setting Up the Test

1. This test can be conducted anywhere there is room to maneuver the turret and three targets can be identified. The targets should be a mix of tanks, trucks or other objects which will provide a thermal image and are at ranges from 500 to 2000 meters. Targets can be moving or stationary and should vary from targets in the open to targets obscured by foliage or partially concealed. You must determine the approximate range to each target.

   (NOTE: It is important that the rangefinder <u>not</u> be used under the above conditions.)

2. Insure the steps in paragraph 3 of the TANK COMMANDER INSTRUCTIONS have been done.

3. Open the THERMAL GPS door.

4. Place the FLTR/CLEAR/SHTR switch to SHTR.

Administering the Test

5. During the test you will issue a fire command for each target that is appropriate for that target and contains a range element. The gun should be off the target at the start of the fire command so that the target is not in the gunner's sight. Lay the gun as you would for an actual engagement. Announce, "CEASE FIRE," and pause long enough between each exercise so that each target is treated as a new engagement. You may repeat the range element if necessary.

Instructions To the Gunner

6. Position the gunner in the gunner's seat and have him adjust his position, head and chest rests as necessary.

7. Have the gunner turn on the TIS and adjust the focus, contrast and brightness as necessary.

8. Tell the gunner, "I WILL ISSUE A FIRE COMMAND AND LAY YOU ON SEVERAL TARGETS. YOU WILL NOT RANGE TO THE TARGET." Pause. Issue your first fire command.

HOW TO SCORE THIS TEST

1. To score the time element of PM 1, "Identified Within 15 Seconds," start timing from the end of your fire command and stop timing when the gunner announces IDENTIFIED. You may use a stopwatch or you can estimate the time accurately by counting (one thousand one . . .). To score the accuracy element of PM 1, you should wait until the gunner takes up final lay to insure the target identified was the test target.

2. To receive a GO on PM 2, "Indexed Announced Range," the gunner must index the exact range you announced in your fire command. You can verify this by having him read back the range after the engagement.

3. There are other aspects of the engagements such as proper fire command responses by the gunner, accuracy of final lay and tracking of targets, which are not listed on the scoresheet. Although specifically tested elsewhere these should not be ignored during this test. If the gunner fails to follow all required procedures, note them in the REMARKS section, withhold certification, correct them and retest.

SCORESHEET: IDENTIFY TARGETS USING THE TIS

GUNNER'S NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test GO	Initial Test NO-GO	Retest-1 GO	Retest-1 NO-GO	Retest-2 GO	Retest-2 NO-GO
Target 1						
1. Identified within 15 seconds.	___	☐	___	☐	___	☐
2. Indexed announced range.	___	___	___	___	___	___
Target 2						
1. Identified within 15 seconds.	___	☐	___	☐	___	☐
2. Indexed announced range.	___	___	___	___	___	___
Target 3						
1. Identified within 15 seconds.	___	☐	___	☐	___	☐
2. Indexed announced range.	___	___	___	___	___	___

REMARKS: Other deficiencies or reasons for not certifying: _____

_____

_____

The gunner must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____

(Date) (Name)

GUNNER TEST 5: APPLY TARGET LEADS

HOW TO TEST THIS TASK

Setting Up the Test

1. This task may be tested anywhere there is room to maneuver the turret and three moving targets can be identified. The targets should be at a range of 500-2000 meters and moving at a speed of 15 mph or less. You must know the approximate range to the targets. Targets can be military or civilian traffic. A combination of target speeds and distances should be used.

   (NOTE: It is important that the rangefinder <u>not</u> be used under the above conditions.)

2. Insure the steps in paragraph 3 of the TANK COMMANDER INSTRUCTIONS have been done.

3. Depress the LEAD button.

Administering the Test

4. During the test you will have the gunner engage a total of three moving targets simulating a lead angle input failure. Issue a fire command for each target that is appropriate for that target and contains a range element. You must use a mix of APDS and HEAT ammunition elements in your fire command. You must include a range element in your fire command. Tell the gunner before the test that actual targets will simulate the target element stated in your fire command. The gun should be off the target at the start of the fire command so that the target is not in the gunner's sight. Lay the gun as you would for an actual engagement. Announce CEASE FIRE and pause long enough between each exercise so that each target is treated as a new engagement. Insure the lead is cancelled before each engagement.

Instructions To the Gunner

5. Have the gunner position himself in the gunner's seat and have him adjust the seat, controls and sights as necessary.

6. Tell the gunner: "THIS EXERCISE WILL SIMULATE A LEAD ANGLE SENSOR FAILURE: I WILL ISSUE YOU A FIRE COMMAND AND LAY YOU ON SEVERAL MOVING TARGETS. DO NOT RANGE TO ANY TARGET." Pause. Issue your first fire command.

HOW TO SCORE THIS TEST

1. To score PM 1, 2 and 3, "Applied Lead Target (Number)," use the following:

TABLE OF MIL LEADS FOR APDS AND HEAT

AMMO	RANGE	SPEED	
		10 MPH	15 MPH
APDS	500-2000	3 mils	4.5 mils
HEAT	500-1000	4 mils	6 mils
	2000	5 mils	7.5 mils

2. There are other aspects of the engagements such as proper fire command responses by the gunner, accuracy of final lay and tracking of targets which are not listed on the scoresheet. Although specifically tested elsewhere, these should not be ignored during this test. If the gunner fails to follow all required procedures, note them in the REMARKS section, withhold certification, correct them and retest.

SCORESHEET: APPLY TARGET LEADS

GUNNER'S NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test		Retest-1		Retest-2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO
1. Applied lead Target 1.	___	___	___	___	___	___
2. Applied lead Target 2.	___	___	___	___	___	___
3. Applied lead Target 3.	___	___	___	___	___	___

REMARKS: Other deficiencies or reasons for not certifying: _____

_____

_____

The gunner must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____

(Date) (Name)

GUNNER TEST 6: APPLY TARGET FORM

HOW TO TEST THIS TASK

Setting Up the Test

1. This task may be tested anywhere there is room to maneuver the turret, and a stationary target can be identified. The targets should be at a range of approximately 1600 meters.

   (NOTE: It is important that the rangefinder <u>not</u> be used under the above conditions.)

2. Insure the steps in paragraph 3 of the TANK COMMANDER INSTRUCTIONS have been done.

Administering the Test

3. During the test you will have the gunner engage a target simulating a first round battlesight miss using target form adjustment. Issue a battlesight fire command that is appropriate for that target. The gun should be off the target at the start of the fire command so that the target is not in the gunner's sight. Lay the gun as you would for an actual engagement.

Instructions To the Gunner

4. Have the gunner position himself in the gunner's seat and have him adjust the seat, controls and sights as necessary.

5. Tell the gunner: "I WILL ISSUE YOU A BATTLESIGHT FIRE COMMAND AND LAY YOU ON THE TARGET. YOU WILL NOT RANGE TO THE TARGET." Pause. Issue the fire command. After the first round announce, "SHORT (or OVER). ADD (or DROP) ONE-HALF."

HOW TO SCORE THIS TEST

1. To receive a GO on PM 1, "Applied Target Form" the gunner must raise or lower (depending on whether you ordered ADD or DROP) one-half of the size of the target from the center base of target.

2. There are other aspects of the engagement such as proper fire command responses by the gunner, acquiring the target and accuracy of initial and final lay which are not listed on the scoresheet. Although specifically tested elsewhere, these should not be ignored during this test. If the gunner fails to follow these and all other required procedures, note them in the REMARKS section, withhold certification, correct them and retest.

SCORESHEET: APPLY TARGET FORM

GUNNER'S NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test		Retest-1		Retest-2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO
1. Applied target form.	___	[redacted]	___	[redacted]	___	[redacted]

REMARKS: Other deficiencies or reasons for not certifying: _____

_____

_____

The gunner must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____

(Date) (Name)

GUNNER TEST 7: ENGAGE TARGETS - PRECISION

HOW TO TEST THIS TASK

Setting Up the Test

1. This test must be conducted on a laser range or other area that has been designated for employment of the LRF. A minimum of four laser targets at ranges from 1000 to 2500 meters, simulating tanks, should be used. Targets may be stationary, moving, or a combination. All precautions for employing the LRF as outlined in DEP 9-2350-10-1 and unit SOP must be observed.

2. Insure the steps in paragraph 3 of the TANK COMMANDER INSTRUCTIONS have been done.

Administering the Test

3. During the test you will issue a fire command for each target that is appropriate for that target. If actual targets are not tanks, instruct the gunner before the test that targets will simulate tanks. The gun should be off the target at the start of the fire command so that the target is not in the gunner's sight. Lay the gun as you would for an actual engagement. Announce, "CEASE FIRE," and pause long enough between each exercise so that each target is treated as a new engagement.

Instructions To the Gunner

4. Have the gunner position himself in the gunner's seat and have him adjust the seat, controls and sights as necessary.

5. Tell the gunner, "I WILL ISSUE A FIRE COMMAND AND LAY YOU ON SEVERAL TARGETS. YOU MUST RANGE AND FIRE AT THE TARGET. I CANNOT HELP YOU MAKE DECISIONS ON THE RANGE RETURN." Pause. Issue your first fire command.

HOW TO SCORE THIS TEST

1. To score PM 1, "Ranged To Target," observe the range return. The range obtained by the gunner must be consistent with the estimated range for the target. The gunner may rerange to obtain the correct range. If the multiple return indicator bar is observed and the gunner fires at a range that is not consistent with the estimated range, mark PM 1 NO-GO.

2. To score PM 2, "Fired Within 15 Seconds," start timing from the end of your fire command and stop timing when the gunner fires. You may use a stopwatch or you can estimate the time accurately by counting (one thousand one . . .).

3. Although not listed on the scoresheet, proper gunner engagement procedure including announcing, "IDENTIFIED" and "ON THE WAY" must be used. Likewise, if moving targets are used, proper tracking procedure must be employed. If the gunner fails to follow these and all other required procedures, note them in the REMARKS section, withhold certification, correct them and retest.

SCORESHEET: ENGAGE TARGETS - PRECISION

GUNNER'S NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test		Retest-1		Retest-2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO
A. Engagement 1						
1. Ranged to target.	___	☐	___	☐	___	☐
2. Fired within 15 seconds.	___	☐	___	☐	___	☐
3. Fired at center of mass.	___	___	___	___	___	___
B. Engagement 2						
1. Ranged to target.	___	☐	___	☐	___	☐
2. Fired within 15 seconds.	___	☐	___	☐	___	☐
3. Fired at center of mass.	___	___	___	___	___	___
C. Engagement 3						
1. Ranged to target.	___	☐	___	☐	___	☐
2. Fired within 15 seconds.	___	☐	___	☐	___	☐
3. Fired at center of mass.	___	___	___	___	___	___
D. Engagement 4						
1. Ranged to target.	___	☐	___	☐	___	☐
2. Fired within 15 seconds.	___	☐	___	☐	___	☐
3. Fired at center of mass.	___	___	___	___	___	___

REMARKS: Other deficiencies or reasons for not certifying: _____

_____

_____

The gunner must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____

(Date) (Name)

GUNNER TEST 8: APPLY BOT

HOW TO TEST THIS TASK

Setting Up the Test

1. This task is tested on a conduct of fire trainer, BOT trainer or other similar training device that allows the strike of the round to be simulated. If a simulator is not available this task can be tested by using a scale drawing of a tank with a movable, clear plastic reticle superimposed and pointing to the simulated strike of the round for a one-second period.

Administering the Test

2. You will present the gunner a total of seven sensings as follows:

Deflection	Range
Left	Doubtful
Right	Over
Line	Target
	Short

These may be presented in any combination of deflection and range sensings.

Instructions To the TC

3. Seat the TC at the trainer (or have him stand in front of the drawings where he can manipulate the movable reticle.

4. Tell the gunner: "DURING THIS TEST I WILL PRESENT YOU WITH A SERIES OF ROUNDS. I WILL ANNOUNCE 'ON THE WAY' BEFORE EACH ROUND. YOU MUST ANNOUNCE YOUR SENSING AND TAKE UP A NEW SIGHT PICTURE WITHIN FIVE SECONDS AFTER THE ROUND APPEARS ON THE TRAINER." Pause. Announce "ON THE WAY" First Round.

HOW TO SCORE THIS TEST

1. To receive a GO on PM 1 through 7, "Announced (Sensing) and Applied BOT," the gunner must announce the sensing and must move the sight so the strike of the round is on the center of the target.

2. To score PM 8, "Applied BOT Within 5 Seconds," start timing when the round appears on the trainer and stop timing when the gunner has a new sight picture if one is necessary for the sensing. You may use a stopwatch or you can estimate the time accurately by counting (one thousand one . . .).

SCORESHEET: APPLY BOT

GUNNER'S NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test		Retest-1		Retest-2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO
1. Announced LEFT and applied BOT.	☐	☐	☐	☐	☐	☐
2. Announced RIGHT and applied BOT.	☐	☐	☐	☐	☐	☐
3. Announced LINE and kept deflection sight picture.	☐	☐	☐	☐	☐	☐
4. Announced OVER and applied BOT.	☐	☐	☐	☐	☐	☐
5. Announced SABOT and applied BOT.	☐	☐	☐	☐	☐	☐
6. Announced DOUBTFUL and kept range sight picture.	☐	☐	☐	☐	☐	☐
7. Announced TARGET and kept range sight picture.	☐	☐	☐	☐	☐	☐
8. Applied each BOT within 5 seconds.	☐	☐	☐	☐	☐	☐

REMARKS: Other deficiencies or reasons for not certifying: _____

_____

_____

The TC must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____

(Date) (Name)

TANK COMMANDER INSTRUCTIONS FOR LOADER'S TEST

1. The loader's test consists of two tasks:

   Task 1 - Load the Main Gun

   Task 2 - Unload the Main Gun

   Both tests are conducted inside the tank turret.

2. Before testing either task make sure the following has been done:

   a. Place turret traverse lock handle to UNLOCK.

   b. Disconnect main gun elevation travel lock.

   c. Turn TURRET POWER switch ON.

   d. Turn AUX HYDR POWER switch ON.

   e. Place the loader knee switch in the DOWN position.

   f. Check the operation of the ready ammunition compartment door. It must operate freely.

   g. Monitor the condition of the batteries periodically during the tests. If the LOW BAT CHARGE caution light comes on, run the engine at tactical idle until the light extinguishes.

3. The only equipment you will need for these tests are two rounds of dummy main gun ammunition. You should also have a stopwatch or a watch with a sweep second hand.

4. Test the tasks in the sequence listed. It will be necessary to have the loader exit the turret after Test 1 while you set up for the second test.

5. Remember to read carefully the sections titled "HOW TO TEST THIS TASK" and "HOW TO SCORE THIS TEST" before you conduct each test.

LOADER TEST 1: LOAD MAIN GUN

HOW TO TEST THIS TASK

Setting Up the Test

1. Insure that the steps in paragraph 2 of the TANK COMMANDER INSTRUCTIONS have been done.

2. Place two dummy rounds in the ready ammunition compartment.

3. Place the ejection guard in the forward (safe) position.

4. Open the breech.

5. Place the GUN TURRET DRIVE switch in POWER.

Administering the Test

6. During this test the loader will load one round and prepare to load the second round. He will start from a standing position on the loader's platform. Seat yourself in the TC seat where you can observe all his actions inside the turret.

   NOTE: Whether the loader uses the seatbelt or not is up to unit SOP and the individual loader. Whether the loader removes the second round from the ammo compartment without command is likewise a matter of unit SOP. You should score these aspects accordingly.

Instructions To the Loader

7. Have the loader stand on the loader's platform.

8. Tell the loader: "WHEN I ISSUE A FIRE COMMAND YOU MUST LOAD ONE ROUND AND BE READY TO LOAD THE SECOND ROUND." Pause. Announce "GUNNER, SABOT TANK."

HOW TO SCORE THIS TEST

1. To receive a GO on PM 4, "Seated Round With a Single Motion," the loader must not cease arm movement from the time he starts to push the round forward until the round seats.

2. To score PM 6, "Announced "UP" Within 6 Seconds," start timing when you announce the ammunition element of the fire command and stop timing when the loader announces "UP." If the loader does not announce "UP," does not announce it within 6 seconds, or does not announce "UP" in the sequence listed on the score sheet, mark PM 6 NO-GO.

SCORESHEET: LOAD MAIN GUN

LOADER'S NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test		Retest-1		Retest-2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO
1. Closed and locked hatch.	___	___	___	___	___	___
2. Turned turret blower on.	___	___	___	___	___	___
3. Ready door clears round.	___	☐	___	☐	___	☐
4. Seated round with a single motion.	___	☐	___	☐	___	☐
5. Placed ejection guard to rear (armed).	___	___	___	___	___	___
6. Announced "UP" within 6 seconds.	___	☐	___	☐	___	☐
7. Kept body clear of recoil path after announcing "UP."	___	☐	___	☐	___	☐
8. Faced ready ammunition door.	___	___	___	___	___	___

REMARKS: Other deficiencies or reasons for not certifying: _____

_____

_____

The loader must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____

(Date) (Name)

Retrain all of the task if the loader gets a NO-GO on 2 or more PM.

LOADER TEST 2: UNLOAD THE MAIN GUN

HOW TO TEST THIS TASK

Setting Up the Test

1. Insure the steps in paragraph 2 of the TANK COMMANDER INSTRUCTIONS have been done.

2. Open ready ammunition door and set discs on all plungers to "P, "B," or "H."

3. Load a dummy main gun round in the chamber.

4. Place the ejection guard in the rear (armed) position.

5. Place the GUN/TURRET DRIVE switch in the MANUAL position.

6. Place the GUN SELECT switch in the SAFE position.

Instructions To the Loader

7. Position the loader in the loader's seat. Have him adjust the seat as necessary.

8. Tell the loader: "A ROUND OF SABOT IS LOADED. YOU MUST REMOVE AND RESTOW THE ROUND. YOU ARE TO PERFORM THE CLEARING PROCEDURE, NOT THE FAILURE TO FIRE PROCEDURE. THE GUNNER'S GUN SELECT SWITCH IS IN SAFE." Pause. "BEGIN."

HOW TO SCORE THIS TEST

1. To receive a GO on PM 5, "performed Above Steps in Sequence," the loader must perform the steps exactly as listed. If he starts to perform a step out of sequence but corrects it, mark PM 5 NO-GO.

2. To receive a GO on PM 6, "Locked Round in Ready Compartment," the round must be held seated by the retaining spring clip.

3. This task is not timed. However, it should be completed within 1 minute. If the loader successfully performs the task but takes what you feel is excessive time you may withhold certification.

SCORESHEET: UNLOAD MAIN GUN

LOADER'S NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test		Retest-1		Retest-2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO
1. Placed ejection guard to forward (safe).	___	___	___	___	___	___
2. Placed GUN/TURRET DRIVE to EL UNCPL	___	___	___	___	___	___
3. Locked breech open.	___	___	___	___	___	___
4. Latched breech operating handle.	___	___	___	___	___	___
5. Performed above steps in sequence.	___	___	___	___	___	___
6. Locked round in ready compartment.	___	___	___	___	___	___
7. Set disc to "S."	___	___	___	___	___	___
8. Kept hand covering base of round during removal and stowage.	___	___	___	___	___	___

REMARKS: Other deficiencies or reasons for not certifying: _____

_____

_____

The loader must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____

(Date) (Name)

TANK COMMANDER INSTRUCTIONS FOR DRIVER'S TEST

1. The driver's test consists of two tasks:

   Task 1 - Drive Tank During Firing

   Task 2 - Fire from the Halt and Hull Defilade

2. Both tests are conducted on a driving course or terrain suitable for tactical driving. A minimum of 1/2 mile distance is required and ideal terrain will allow a choice of routes. The terrain should also allow a choice of several hull defilade positions. Targets or panels may be positioned on the course but are not required.

3. The driver must be minimally qualified to operate the XM1 before taking this test; that is, he must be already licensed on the XM1.

4. Before each test make sure the following has been done:

   a. Position the driver inside the driver's compartment and have him close and lock his hatch.

   b. Have the driver adjust his vision blocks as necessary.

   c. Place turret traverse lock handle to UNLOCK.

   d. Disconnect main gun elevation travel lock.

   e. Turn TURRET POWER switch ON.

   f. Place the GUN/TURRET DRIVE switch in POWERED.

   g. Connect TC and driver CVC and conduct an intercom check.

   h. Place the gun tube over the front of the tank.

   (NOTE: It is not necessary to have any other crewmembers in the tank to conduct these tests.)

5. The only equipment you will need for these tests are two CVC.

6. Conduct the tests in the sequence listed.

7. Remember to read carefully the sections titled "HOW TO TEST THIS TASK" and "HOW TO SCORE THIS TEST" before you conduct each test.

DRIVER TEST 1: DRIVE TANK DURING FIRING

HOW TO TEST THIS TASK

Setting Up the Test

1. Insure that the steps in paragraph 4 of the TANK COMMANDER INSTRUCTIONS have been done.

Administering the Test

2. You will administer the test from the TC hatch. Start the test with the engine off. Issue at least two turning commands during the test. You will also issue a fire command and lay the gun for direction at least once. The driver's speed will depend on the terrain but should be approximately 40 kph.

Instructions To the Driver

3. Tell the driver: "WHEN I TELL YOU, YOU WILL START THE TANK AND FOLLOW THE (TRAIL, TRACKS, ROAD). MAINTAIN A SPEED OF FORTY KILOMETERS PER HOUR AND FOLLOW MY INSTRUCTIONS. WE WILL BE ENGAGING AT LEAST ONE MAIN GUN TARGET ON THE MOVE." Pause. "START THE ENGINE."

HOW TO SCORE THIS TEST

1. To receive a GO on PM 1, "Responded To Driving Commands," the driver must react immediately to all maneuver commands. Turns must be done smoothly without undue jarring of the crew. The driver must not underrespond or overrespond to turning commands and must select the best available terrain after making turns.

2. To receive a GO on PM 2, "Maintained Steady Speed During Engagement," the driver must maintain a speed of approximately 40 kph (depending on conditions of terrain) during the engagement. Any acceleration or deceleration must be smooth without any jerkiness. The speed must not be too fast for conditions nor too slow to increase the vulnerability of the tank. Correct speed should be established and maintained without command.

3. To receive a GO on PM 3, "Maintained Steady Track During Engagement," the driver should not adjust his track until the engagement is complete. If turns are necessary to avoid obstacles they must be done gradually.

4. To receive a GO on PM 4, "Alerted TC of Obstacles During Engagement," the driver must announce "BUMP" or other suitable warning approximately 3-5 seconds before the obstacle is encountered.

5. There are other aspects of driving the tank such as starting the vehicle, shifting and stopping, which are not specifically listed on the scoresheet but which should not be ignored during this test. If the driver fails these or any other aspect of driving you should note them in the REMARKS section, withhold certification, correct him and retest.

SCORESHEET: DRIVE TANK DURING FIRING

DRIVER'S NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test		Retest-1		Retest-2	
	GO	NO-GO	GO	NO-GO	GO	NO-GO
1. Responded to driving commands.	___	___	___	___	___	___
2. Maintained steady speed during engagement.	___	___	___	___	___	___
3. Maintained steady track during engagement.	___	___	___	___	___	___
4. Alerted TC of obstacles during engagement.	___	___	___	___	___	___

REMARKS: Other deficiencies or reasons for not certifying: _____

_____

_____

The driver must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____
(Date) (Name)

DRIVER TEST 2: FIRE FROM THE HALT AND HULL DEFILADE

HOW TO TEST THIS TASK

Setting Up the Test

1. Insure that the steps in paragraph 4 of the TANK COMMANDER INSTRUCTIONS have been done.

Administering the Test

2. You will administer the test from the TC hatch. Issue at least one at-halt fire command by announcing "DRIVER STOP" followed by "DRIVER, MOVE OUT" after the engagement. If suitable terrain exists you will also select and direct the driver to a hull defilade position.

Instructions To the Driver

3. Tell the driver: "WHEN I SAY 'BEGIN' YOU WILL FOLLOW THE (TRAIL, TRACKS). YOU MUST ESTABLISH A SPEED OF FORTY KILOMETERS PER HOUR." Pause. Announce "DRIVER, MOVE OUT."

HOW TO SCORE THIS TEST

1. To receive a GO on PM 1, "Brought Tank To a Smooth Stop." the driver must stop immediately when you announce "DRIVER STOP" but must do so without throwing you off balance or causing unnecessary jarring.
2. To receive a GO on PM 2, "Moved To Hull Defilade Position," the driver must move immediately to the location you identify and take up a position with the front of the tank headed into the defilade and with only the turret exposed.
3. There are other aspects of tank driving such as starting, shifting, accelerating, decelerating, maintaining steady speed and direction and responding to other TC commands which are not listed on the scoresheet. These should not be ignored during this test. If these or other required driving procedures are not done, you should note them in the REMARKS section, withhold certification, correct them and retest.

SCORESHEET: FIRE FROM HALT AND HULL DEFILADE

DRIVER'S NAME _____

TANK NUMBER _____

PERFORMANCE MEASURES	Initial Test GO	Initial Test NO-GO	Retest-1 GO	Retest-1 NO-GO	Retest-2 GO	Retest-2 NO-GO
1. Brought tank to a smooth stop.	___	☒	___	☒	___	☒
2. Moved into hull defilade position.	___	☐	___	☐	___	☐

REMARKS: Other deficiencies or reasons for not certifying: _____

The driver must receive a GO on all Performance Measures before you certify.

I CERTIFY ON: _____ BY: _____

(Date) (Name)

PLATOON LEADER INSTRUCTIONS FOR CREW DRILL EVALUATIONS

1. The crew evaluations consist of three simulated fire exercises. They are normally conducted in the same area as the Crew Drill practice was conducted.
2. You will require a stopwatch for the evaluations. Two rounds of dummy SABOT ammunition are also required. The TC is allowed to use his binoculars.
3. The crew is responsible to conduct all before operations and firing checks before the exercise as well as being responsible for the complete and operational status of the vehicle and weapons systems. All weapons must be mounted. Allow the crew ample time (20 minutes) to prepare the vehicle before the start of the exercise. If the three exercises are run consecutively, only preparation time before the first evaluation need be given.
4. Before each evaluation make sure the following is done:
   a. Connect into the intercom and position yourself on the turret where you can observe the TC, loader, and targets.
   b. Have the crew load two rounds of dummy main gun ammunition behind the ammunition door.
   c. Have the crew open the breech.
   d. Have the crew set the fire controls as if enemy contact was expected.
5. You may give the crew instructions in advance or repeat the instructions at any time up to when the evaluation actually starts.
6. The evaluation guidelines for each drill lists only the major and most observable crew actions and the Performance Measures (PM) are not meant to cover all the actions which will occur. Use the PM as a guide to where the crew is in the exercise. Because crew drills occur rapidly, it is recommended that you mark only NO-GOs with an X in the space provided. Besides the listed PM you must be alert for other failures on the part of the crew. To do this you must be familiar with the entire exercise. You must also be alert for contributory failure on the part of other crewmen. For example, if the gunner cannot identify the target because of poor gun lay by the tank commander, this must be identified. You must also be alert to the <u>cause</u> of a NO-GO. For example, the loader may be slow in loading a round because he does it incorrectly or because he does not react immediately to the fire command. it is expecially important in time NO-GOs that you be able to identify the reasons for the failures.
7. Each exercise must be run a minimum of twice. The conditions do not have to be the same on the second run. In fact, if conditions permit, alter the location of the targets for the repetions. Your evaluation can be a composite of the two runs. If you missed or were unable to evaluate a particular segment during the first run, concentrate on that during the second run even if it means ignoring another segment during the second run. If the crew passes something the first run and not the second or vice versa, you must use your judgment about whether to score that a GO or NO-GO. In most cases a third run is recommended to resolve a scoring difference. Do not certify the crew until you are satisfied that GOs represent the crew's true abilitv. There is no limit on the amount of times an exercise can be run.
8. Read HOW TO SET UP THIS DRILL and HOW TO SCORE THIS EVALUATION <u>before</u> you conduct each exercise.

CREW EVALUATION 1: MAIN GUN AND COAX

HOW TO SET UP THIS DRILL

1. This exercise consists of an evaluation of Crew Drill Number 7 which is multiple target servicing, main gun and coaxial machinegun, moving versus two stationary targets.
2. The evaluation is normally conducted on the same range that Crew Drill practice was conducted on but, if possible, targets should be in different locations. Targets will consist of a tank target between 1000-2000 meters and troop silhouettes between 500-900 meters. The targets can appear in any sequence. Under ideal conditions the targets should not be visible at the start of the course. However, if they are, you should designate to a crewmember when he may acquire the target. If the range does not meet the requirements for laser safety, then the exercise will be run battlesight and the crew informed.
3. Make sure all the steps in paragraph 4 of the PLATOON LEADER'S INSTRUCTIONS have been done.
4. Tell the crew the following instructions. Add any instructions regarding use of the LRF or if you will identify targets: "DURING THIS EVALUATION YOU WILL BE ENGAGING BOTH A MAIN GUN AND A COAX TARGET WHILE MOVING. THE MAIN GUN TARGET MUST BE ENGAGED WITH TWO ROUNDS. THE BREECH MUST BE OPEN AT THE START BUT YOU WILL SIMULATE THAT THERE IS A ROUND OF SABOT LOADED. THE SECOND ROUND MUST BE LOADED. DRIVER, YOU MUST HAVE YOUR HATCH CLOSED. LOADER, YOU MUST BE OBSERVING OUT OF YOUR HATCH. TC, YOU MAY HAVE YOUR HATCH OPEN." (Check breech, driver and loader.) "ARE THERE ANY QUESTIONS?" You may answer any reasonable questions about the exercise except those pertaining to scoring. "TC, YOU MAY BEGIN."

HOW TO SCORE THE EVALUATION

1. PM 1. If run battlesight, the command must be GUNNER, BATTLESIGHT, TANK.
2. To score a GO on PM 16, "Maintained Steady Speed and Direction," once the engagement begins the driver should not turn, accelerate or decelerate again unless absolutely necessary until the engagement is complete. Although the desired speed is 35 KPH, terrain conditions may dictate a different speed. Speed must not be too fast for ground conditions or too slow to increase the vulnerability of the tank. Steady speed and direction are most critical between the command FIRE and the firing of the gun and you should score accordingly.
3. To score a GO on PM 17, "Driver Alerts Crew To All Obstacles," the driver must call out bumps or turns 3 to 5 seconds before they are encountered.
4. To score a GO on PM 18, "Responded To TC Commands," the driver must adjust his speed and direction as directed by the TC. It is not necessary that the TC issued driving commands but if he does they must be followed. The TC is responsible for the direction and movement of the vehicle.
5. To score a GO on PM 19, "Crew Reported Status," if the crew does not report on their own, the TC must call for a status report.
6. To score the time on PM 20, "Crew Completed Main Gun Engagement Within 15 Seconds," start timing when the TC starts the fire command and stop timing when he announces CEASE FIRE.
7. To score the time on PM 21, "Crew Completed Coax Engagement Within 20 Seconds," start timing when the TC begins his coax fire command and stop timing when he announces CEASE FIRE.

CREW EVALUATION GUIDELINES: MAIN GUN AND COAX

	TC	GUNNER	LOADER	DRIVER
Main Gun 1st Round	1. Announced GUNNER, SABOT, TANK ☐	3. Announced IDENTIFIED ☒	2. Closed and locked hatch ___ 4. Announced UP ___	
	5. Announced FIRE ___	6. Announced ON THE WAY ☒		
Main Gun 2nd Round		9. Announced ON THE WAY ☒	7. Loaded round ___ 8. Announced UP ___	
	10. Announced TARGET, CEASE FIRE ___			
Coax	11. Announced GUNNER, COAX, TROOPS ___	12. Announced IDENTIFIED ☒		
	13. Announced FIRE ___	14. Announced ON THE WAY ___		
	15. Announced TARGET CEASE FIRE ___			
Coax and Main Gun				16. Maintained steady speed/direction ___ 17. Alerted crew to all obstacles ___ 18. Responded to TC commands ☒

CREW PERFORMANCE MEASURES

19. Crew reported status ☒
20. Crew completed main gun engagement within 15 seconds ☐
21. Crew completed coax engagement within 20 seconds ☐

Crew completed drill without error and within time limits this date _____

Certified by

CREW TEST 2: MAIN GUN AND CALIBER .50

HOW TO SET UP THIS DRILL

1. This exercise consists of an evaluation of Crew Drill Number 8 which is simultaneous target servicing, main gun and caliber .50, stationary versus two stationary targets.

2. The evaluation is normally conducted on the same range that Crew Drill practice was conducted on but, if possible, targets should be in 1000-2000 meters and a wheeled vehicle target between 800-1000 meters. The targets should be located approximately 90° apart. Under ideal conditions the targets should not be visible at the start and should appear simultaneously. However, if the targets are fixed, you should designate to a crewmember when he may acquire the target. If the range does not meet the requirements for laser safety then the exercise will be run battlesight and the crew informed.

3. Make sure the steps in paragraph 5 of the PLATOON LEADER'S INSTRUCTIONS have been done.

4. Tell the crew the following instructions. Add any instructions regarding use of the LRF or if you will identify targets: "DURING THIS TEST YOU WILL BE ENGAGING BOTH A MAIN GUN AND A CALIBER FIFTY TARGET FROM A STATIONARY POSITION. THE MAIN GUN TARGET MUST BE ENGAGED WITH TWO ROUNDS. THE BREECH MUST BE OPEN AT THE START BUT YOU WILL SIMULATE THAT THERE IS A ROUND OF SABOT LOADED. THE SECOND ROUND MUST BE LOADED. DRIVER, YOU MUST HAVE YOUR HATCH CLOSED. LOADER, YOU MUST BE OBSERVING OUT OF YOUR HATCH. TC, YOU MAY HAVE YOUR HATCH OPEN." (Check breech, driver and loader.) "ARE THERE ANY QUESTIONS?" You may answer any reasonable questions about the exercise except those pertaining to scoring. "TC, YOU MAY BEGIN."

HOW TO SCORE THIS EVALUATION

1. PM 1. If run battlesight the command must be GUNNER, BATTLESIGHT, TANK.

2. To score PM 11, "Completed Caliber .50 in 15 Seconds," start timing when the TC drops down into the sight and stop timing when he announces "TC COMPLETE."

3. To score PM 16, "Crew Completed Main Gun Engagement Within 15 Seconds," start timing when TC starts the fire command and stop timing when gunner announces "TARGET, CEASE FIRE."

4. To score a GO on PM 17, "Crew Reported Status," if the crew does not report on their own, the TC must call for a status report.

CREW EVALUATION GUIDELINES: MAIN GUN AND CALIBER .50

	TC	GUNNER	LOADER	DRIVER
Main Gun 1st Round	1. Announced GUNNER, SABOT, TANK ☐	3. Announced IDENTIFIED ☐ 5. Announced ON THE WAY ☐	2. Closed and locked hatch ___ 4. Announced UP ___	
C-56 Caliber .50	6. Dropped down into periscope ___ 7. Announced FIRE and ADJUST CALIBER FIFTY ___ 8. Lay .50 Caliber on target ___ 9. Fired using periscope ___ 10. Announced TC COMPLETE ___ 11. Completed Caliber .50 in 15 seconds ___			
Main Gun 2nd Round		14. Announced ON THE WAY ☐ 15. Announced TARGET, CEASE FIRE ___	12. Loaded round ___ 13. Announced UP ___	

CREW PERFORMANCE MEASURES

16. Crew reported status ☐
17. Crew completed main gun engagement within 15 seconds ☐

Crew completed drill without error and within time limits this date _____

Certified by _____

CREW EVALUATION 3: GAS ENGAGEMENT

HOW TO SET UP THIS DRILL

1. This exercise consists of a test of Crew Drill Number 14 which is single target servicing, main gun, stationary versus one stationary target using the gunner's auxiliary sight. A GPS failure is simulated.
2. The test is normally conducted on the same range that Crew Drill practice was conducted on but, if possible, the target should be in a different location. The target will consist of a tank target located between 1000-2000 meters. You must determine the exact distance to the target. Under ideal conditions the target should not be visible at the start. However, if it is, you should designate to a crewmember when he may acquire the target.
3. Make sure the steps in paragraph 5 of the PLATOON LEADER'S INSTRUCTIONS have been done.
4. Have the crew close both the Daylight and Thermal doors.
5. Tell the crew the following instructions. Add necessary instructions if you will be identifying when to engage the target: "DURING THIS TEST YOU WILL BE ENGAGING A MAIN GUN TARGET WITH THE GAS WHILE STATIONARY. BOTH BALLISTIC DOORS ARE TO REMAIN SHUT DURING THE EXERCISE. THE TARGET MUST BE ENGAGED WITH TWO ROUNDS. THE BREECH MUST BE OPEN AT THE START BUT YOU WILL SIMULATE THAT THERE IS A ROUND OF SABOT LOADED. THE SECOND ROUND MUST BE LOADED. TC, I WILL ANNOUNCE A ROUND SENSING AFTER THE FIRST ROUND. DRIVER, YOU MUST HAVE YOUR HATCH CLOSED. LOADER, YOU MUST BE OBSERVING OUT OF YOUR HATCH. TC, YOU MAY HAVE YOUR HATCH OPEN." (Check breech, ballistic doors, driver and loader.) "ARE THERE ANY QUESTIONS?" You may answer any reasonable questions about the exercise except those pertaining to scoring. "TC, YOU MAY BEGIN." After the gunner announces "ON THE WAY" for the first round, give the TC a sensing that includes both a deflection and azimuth element. For example, "OVER, LEFT 100 METERS."

HOW TO SCORE THIS EVALUATION

1. To score a GO on PM 1, "Announced GUNNER, SABOT, TANK (RANGE)," the TC must announce a range that is within 200 meters of the actual range.
2. To score a GO on PM 7, "Announced Correction," the TC must give the gunner a correction that reflects the sensing you gave him. It must be opposite of the sensing.
3. To score a GO on PM 12, "Crew Reported Status," if the crew does not report on their own, the TC must call for the status report.
4. To score the time on PM 13, "Crew Completed Engagement Within 15 Seconds," start timing when the TC begins the fire command and stop timing when the TC announces "CEASE FIRE."

CREW EVALUATION GUIDELINES: GAS

	TC	GUNNER	LOADER	DRIVER
1st Round	1. Announced GUNNER, SABOT, TANK (RANGE) ☐		2. Closed and locked hatch ___	
			3. Announced UP ___	
		4. Announced IDENTIFIED ■		
	5. Announced FIRE ___	6. Announced ON THE WAY ☐		
2nd Round	7. Announced correction ___			
			8. Loaded round ___	
			9. Announced UP ___	
		10. Announced ON THE WAY ☐		
	11. Announced TARGET, CEASE FIRE ___			

CREW PERFORMANCE MEASURES

12. Crew reported status ■

13. Crew completed engagement within 15 seconds ☐

Crew completed drill without error and within time limits this date _____

Certified by _____

REMEDIATION BOOKLET
FOR XM1 CREWMAN TESTS

GUNNER, LOADER, DRIVER

REMEDIATION BOOKLET
FOR XM1 CREWMAN TESTS FOR TC
AND
CREW DRILL EVALUATIONS

TRAINING MODEL

When you must retrain an entire task, use the following procedure:

A. Have the crewman perform the task while you observe closely.
B. When he comes to a step he cannot do or does incorrectly, tell him how to do it correctly.
C. If he still cannot do that step, demonstrate how it is done.
D. Have him practice that step while you observe.
E. Have him perform again until he has difficulty with another step.
F. Repeat the "tell and show" process.
G. Have him practice all steps together.
H. Retest.

2

TRAINING MODEL FOR INDIVIDUAL TESTS

When you must retrain an entire task, use the following procedure:

A. Have the TC perform the task while you observe closely.
B. When he comes to a step he cannot do or does incorrectly tell him how to do it correctly.
C. If he still cannot do that step, demonstrate how it is done.
D. Have him practice the step while you observe.
E. Have him perform again until he has difficulty with another step.
F. Repeat the "tell and show" process.
G. Have him practice all the steps together.
H. Retest.

2

HOW TO USE THIS BOOKLET

When you give the XM1 crewman tests a crewman may get a NO-GO on a performance measure (PM) that has a color-coded box. The box means that this booklet contains recommendations for training the crewman on that PM. Open the training guide to the section for the crew position, turn to the tabs that have the same number as the test, and find the tab that is the same color as the box. The suggestions on that page will help you diagnose the crewman's performance so your training will be more efficient.

A crewman may get a NO-GO on a PM that does not have a color-coded box. In such cases, follow the normal remediation training model--tell the crewman to perform the step; if he cannot, tell him how to do the step; if he still cannot do the step, demonstrate the step.

In all cases where a crewman gets a NO-GO, retest the entire task to be sure he can do the task without help.

HOW TO USE THIS BOOKLET

When you give the TC tests, a TC may get a NO-GO on a performance measure (PM) that has a color-coded box. The box means that this booklet contains recommendations for training the crewman on that PM. Turn to the tabs that have the same number as the test and find the tab that is the same color as the box. The suggestions on that page will help you diagnose the TC's performance so your training will be more efficient.

A TC may get a NO-GO on a PM that does not have a color-coded box. In such cases, follow the normal remediation training model--tell the crewman to perform the step; if he cannot, tell him how to do the step; if he still cannot do the step, demonstrate the step.

In all cases where a TC gets a NO-GO, retest him to be sure he can do the task without help.

GUNNER TEST

1. Load/Clear the Coax Machinegun
2. Prepare for Main Gun Firing
3. Engage Targets - Battlesight
4. Identify Targets Using the TIS
5. Apply Target Leads
6. Apply Target Form
7. Engage Targets - Precision
8. Apply BOT

TC TEST

1. Load, Engage and Clear the Caliber .50 Machinegun
2. Engage Targets
3. Acquire Targets Using the TIS
4. Monitor Engagements
5. Track Targets
6. Monitor Lasing
7. Round Sense

G
1

TASK: LOAD/CLEAR THE COAX MACHINEGUN

If the gunner passes all PM, but you are not satisfied with his speed, have him practice the procedure until he can load in 40 seconds and clear in 50 seconds.

If the gunner is proficient in only one aspect of the task (loading or clearing), train and retest him only on the aspect he failed.

5

BL
1

TASK: LOAD, ENGAGE AND CLEAR THE CALIBER .50 MACHINEGUN

When remediating, treat each procedure (Loading, Engaging, Clearing) separately.

If the TC was NO-GO on <u>one</u> PM in any procedure, tell him what he did wrong.

If the TC was NO-GO on <u>two</u> or more PM in any procedure, retrain the entire procedure.

5

TASK: PREPARE FOR MAIN GUN FIRING

BR 2

If gunner omits a step, tell him what is required and have him practice until he does all steps in 40 seconds.

TASK: ENGAGE TARGETS

PM: Layed Gun on Target

R 2

If the TC failed this PM you must determine the cause of the problem.

Insure the commander's seat height is properly adjusted to allow comfortable access to the GPS extension.

Insure the GPS extension browpad is adjusted to fit the TC.

Insure the GPS extension focus is adjusted for maximum clarity.

Insure the intermediate platform is properly adjusted.

When standing, the TC should be name tag high to the top opening of the hatch. The power control handle must be within comfortable reach at this position.

Have the TC perform a target lay while you observe him. Insure he has obtained a good visual reference to the target before laying the gun.

(More on next page)

TASK: ENGAGE TARGETS - BATTLESIGHT

PM: Announced IDENTIFIED

If the gunner acquires the target but does not announce IDENTIFIED, he is forgetting the step. Remind him hat he must announce IDENTIFIED and have him repeat the engagement.

If the gunner is unable to acquire the target, be sure he starts the search for the target with magnification in 3X and only moves to 10X after the target is acquired.

If the gunner uses the correct magnification but is still too slow or unable to acquire the target, follow the remediation for "Announce ON THE WAY within 10 seconds" (3 Blue next page).

R 3

7

TASK: ENGAGE TARGETS

PM: Layed Gun on Target (Cont'd.)

If the gunner's reticle is overshooting the target, have the TC practice slowing the speed of the turret as the gun tube approaches the target.

R 2

Have the TC practice making short lays where the target is just on the edge of the gunner's sight and only horizontal lays are necessary. Using the same target, have the TC lay from both right and left. Have the TC refer to the GPS extension to identify when the target comes into view so he obtains a "feel" for the field of the GPS sight. Next, have the TC practice vertical lays using the same procedure. Using different targets and ranges, increase the distance from the gun tube position to the target. Continue practice concentrating on speed.

Use different targets for the retest.

7

TASK: ENGAGE TARGETS - BATTLESIGHT

PM: Announced ON THE WAY Within 10 Seconds

Be sure gunner can see targets clearly.

Check seating position and head rest and chest rest position.

See if sight is frosted (if so, activate defroster).

Be sure magnification is on 10X..

Be sure FLTR/CLEAR/SHTR switch is set to FILTER or CLEAR to match light conditions.

Be sure gunner has adjusted focus for the clearest picture at a 1600 meter target.

BL 3

(More on next page)

8

TASK: ENGAGE TARGETS

PM: Issued (Target) Fire Command

If the TC issues an incorrect fire command or omits part of the fire command, tell him what the correct command is.

If he misses 2 or more parts of all fire commands, have him review TEC Lesson 020-171-5359.

Have him practice by issuing fire commands rapidly for a variety of targets.

G 2

8

TASK: ENGAGE TARGETS - BATTLESIGHT

PM: Announced ON THE WAY Within 10 Seconds [Cont'd.]

Check aiming technique.

Be sure gunner allows turret to stop completely with handles centered and palm switches depressed while taking over control from TC.

BL 3

Be sure gunner maintains continuous pressure on palm switches.

PRACTICE

Beginning with the nearest target, lay the gun slightly off target and have the gunner make the final lay. Move to more distant targets making your lay for direction less precise. Be sure to offset your lay in different directions.

Have the gunner develop accuracy. Then improve his speed.

TASK: ENGAGE TARGETS

PM: Announced Range To Target

BR 2

If the TC announces a range that is over 200 meters in error of any actual range, pick out several objects at varying ranges over varying types of terrain and lighting conditions. You must know or determine the actual range. Have him estimate the ranges to those targets and identify the ranges/ conditions which cause him the most problems. Have him practice on these. Initially allow all the time required, then have him make estimates rapidly.

When you retest, use different ranges than originally used.

TASK: ENGAGE TARGETS - BATTLESIGHT

PM: Maintained a Smooth Track Before Firing

Tell gunner the systems must momentarily stabilize after slewing

Demonstrate a smooth track from the TC position.

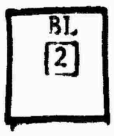
10

TASK: ENGAGE TARGETS

PM: Completed Lay Within 10 Seconds

If the TC failed the time limit but did not fail any other PM, have him practice concentrating on speed.

If other PM were failed, correct those before concentrating on speed.



10

TASK: ENGAGE TARGETS - BATTLESIGHT

PM: Fired at Center Base of Target

Demonstrate the correct sight picture for battlesight gunnery.

G
3

PRACTICE

Have gunner take up sight picture on several targets.

TASK: ACQUIRE TARGETS USING THE TIS

PM: Announced Range To Target (Number)

If the TC errs in his range estimation, follow the procedure in Test 2 (Brown) but do all practice using only the TIS.

3

If the TC fails to identify one or more of the targets, insure the TC knows the proper procedure for scanning the battlefield using the TIS. Have him develop and practice a systematic scanning method starting close in and scanning out in quick overlapping sweeps.

Use different target locations for retesting.

TASK: ENGAGE TARGETS - BATTLESIGHT

PM: Continued Tracking After Firing

Demonstrate correct firing technique from TC position.

P
3

PRACTICE

Have gunner track moving targets without firing. Then have him track targets and simulate firing within the track.

TASK: ACQUIRE TARGETS USING THE TIS

PM: Completed All Engagements in 2 Minutes

If the TC fails the time limit but receives a GO on all other PM, insure that he knows the proper procedure for scanning the battlefield using the TIS. Have him develop and practice a systematic scanning method starting close in and scanning out in overlapping sweeps. Have him concentrate on rapid scanning, stopping only to check out possible targets.

G
3

Use different target locations for retesting.

TASK: IDENTIFY TARGETS USING THE TIS

PM: Identified Within 15 Seconds

Check the gunner's head rest position.

Tell the gunner to look at a target at the mid range. Ask if the target is clear. If it is not, have him adjust focus on eyepiece.

Be sure the gunner has properly adjusted for contrast.

Be sure the gunner has adjusted for brightness.

Be sure the gunner searches for targets with 3X magnification then switches to 10X magnification.

Be sure polarity - BLACK HOT or WHITE HOT - matches background.

K 4

13

TASK: MONITOR ENGAGEMENTS

PM: Correct Wrong Sight Picture

Insure the TC is dropping down onto the GPS extension before issuing the command "FIRE."

Insure the TC knows the correct battlesight aiming point. Demonstrate it to him by laying on several targets.

Have the TC practice taking up final battlesight lay on several targets while you monitor from the gunner's position.

Vary the errors you commit during retesting.

R 4

13

TASK: APPLY TARGET LEADS

PM: Applied Lead

Be sure the gunner knows the proper lead for range, ammunition, and speed. If necessary, have him learn the table in scoring instructions.

Be sure the gunner is able to estimate target speed. Have the gunner announce the speed of several moving targets that he views through the GPS. Compare with known speed or your estimate of the speed.

If the gunner's ability to estimate target speed does not improve, have him review TEC Lesson 020-171-5323.

BL 5

(More on next page)

TASK: MONITOR ENGAGEMENTS

PM: Correct Wrong Track

Insure the TC is dropping down onto the GPS extension before issuing the command "FIRE."

Insure the TC knows the correct tracking procedure and battlesight aiming point for a moving target.

Demonstrate it for him.

Have the TC practice tracking several targets while you monitor from the gunner's position.

Vary the errors you commit during retesting.

BL 4

TASK: APPLY TARGET LEADS

PM: Applied Lead [Cont'd.]

Be sure the gunner knows how to apply the mil reading to the sight. Pick out a stationary target. Announce different mil readings and have the gunner apply those mil leads to the stationary target.

Check the smoothness of the track. Be sure the gunner knows that the systems must momentarily stabilize just before firing.

BL 5

Check the hand off. Be sure the gunner allows the turret to stop completely with handles centered and palm switches depressed.

Be sure you slow down your lay before the gunner takes over.

15

TASK: MONITOR ENGAGEMENTS

PM: Corrected Only Wrong Actions

Refer to Test #4 (Red) or Test #4 (Blue) depending on whether the problem was on stationary or moving targets.

BR 4

15

TASK: APPLY TARGET FORM

PM: Applied Target Form

Be sure the gunner's initial aiming point is at the center base of the target.

Be sure the gunner knows what the commands "1 Form" and "1/2 Form" mean when applied to the sight and target.

Demonstrate target form adjustment on targets at various ranges.

TASK: TRACK TARGETS

PM: Tracked Target (Number)

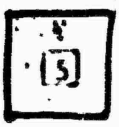
Insure the TC knows the proper battlesight picture for a moving object.

Insure the TC is slowing the movement of the turret as he approaches the target.

Insure the TC is maintaining a steady track and is allowing the system to stabilize momentarily before firing.

Insure the TC continues to track after firing.

Have the TC practice laying on and tracking several targets.



TASK: ENGAGE TARGETS - PRECISION

PM: Ranged To Target

Insure the gunner does not release the palm switches during the engagement.

Be sure the gunner sets the RANGE switch to ARM LST RTN for normal close-in or medium range targets.

Be sure the gunner sets the RANGE switch to ARM FIRST RTN for small or distant targets.

Be sure the gunner knows that when he gets a reading on the multiple return indicator bar, he must decide whether to use range indicated, rerange, or estimate range.

(More on next page)

RS [7]

TASK: TRACK TARGETS

PM: Completed Engagements in 20 Seconds

You must determine if the cause of the delay is inability to maintain the correct sight picture or if he was merely slow. If he has problems maintaining the sight picture have him practice concentrating on smooth continuous tracking especially after firing the first round. If he otherwise performs correctly but is slow have him practice firing within 3 seconds after getting the correct sight picture and track.

P [5]

TASK: ENGAGE TARGETS - PRECISION

PM: Ranged To Target [Cont'd.]

Check the gunner's ability to estimate range through the GPS. Select targets of known range or estimate range to several targets. The gunner's estimates should be within 200 meters of the distance. If his ability to estimate does not improve after several trials, have him review TEC Lesson 020-171-5322.

PRACTICE

Have the gunner practice laser ranging at the range and type targets that cause him the most difficulty. Retest with different targets.

TASK: MONITOR LASING

PM: Issued Correct Instructions Target (Number)

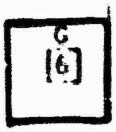
Insure the TC knows the procedure for monitoring ranging.

Insure the TC is observing the range return in the GPS extension.

Insure the TC can estimate range. Pick out several objects at various known ranges and have him announce the range.

Identify ranges and conditions he is having problems with and have him practice at these ranges.

Use different targets during retesting.



TASK: ENGAGE TARGETS - PRECISION

PM: Fired Within 15 Seconds

If the gunner ranges correctly but is slow, check his ability to identify targets and make final lay (Refer to Test 3 - Blue).

PRACTICE

Have the gunner practice making initial and final lay on several targets gradually increasing speed. Retest using different targets.

TASK: ROUND SENSE

PM: Sensed (Azimuth/Defl)

If the TC missed only one sensing show him which one he missed and what the correct sensing is. Retest that sensing along with two other sensings.

If the TC receives a NO-GO on two or more of the PM have him review TEC Lesson 020-171-5362 and practice on the trainer.

TASK: APPLY BOT

Make sure the gunnerknows to "fix" the spot of the round on the sight and move that point to the center mass of target.

Have the gunner review TEC Lesson 020-171-5329. Practice on different BOT adjustments concentrating on the ones that the gunner has the most problems with.

R
8

TASK: ROUND SENSE

PM: Announced Each Sensing Within 3 Seconds

If this occurred on only one sensing and the sensing was correct tell him the failure and retest on that sensing along with two other sensings.

If this occurred on two or more sensings and the sensing were correct, have him practice on the trainer working the sensing more rapidly.

If this occurred on two or more sensings and any of the sensings were incorrect have him review TEC Lesson 020-171-5362 and follow this with practice on the trainer.

BR
7

LOADER TEST

1. **Load Main Gun**

2. **Unload Main Gun**

CREW DRILLS

Announced GUNNER, SABOT, TANK

Announced IDENTIFIED

Responded To TC Commands

Announced ON THE WAY

Crew Completed Engagement Within ___ Seconds

Crew Reported Status

TASK: LOAD MAIN GUN

PM: Ready Door Clears Round

Check to see that the loader is seated properly to maintain contact with the knee switch.

Make sure the loader continues to maintain contact with the knee switch until the round is completely clear.

Have the loader acquire and practice a technique and position that are comfortable for him and that insures the round clears the door before releasing the knee switch.

REMEDIATION PROCEDURE

On each Evaluation Guideline some PM are color coded. These color codes refer to specific steps on the following pages that you should take in the case of a NO-GO.

If there is no color code under the PM then refer to the individual tests for the crew position that received a NO-GO on the PM. There you will find training recommendations for individual failures.

TASK: LOAD MAIN GUN

PM: Seated Round With a Single Motion

Insure the loader has established a technique and position that is comfortable for him and allows him to seat the round without passing.

If the loader loads sitting down, have him sit forward on the outer edge of the seat pan.

If the loader is short or of slight build, have him stand up while loading.

Insure the loader has a good solid body position and has transferred all his effort to his right arm before he starts to ram the round into the breech.

R

PM: Announced GUNNER, SABOT, TANK

If the TC does not issue the correct fire command at the correct time, determine whether the crew acquired the target in time. If the crew did acquire the target in time, train the TC in target identification and fire command procedures.

If the crew did not acquire the target in time:

- Ask each crewmember to identify his observation sector.
- Check whether sectors cover all areas and overlap.
- Have each crewmember report acquisition of the target to the TC. A crewmember may report by any method (clock, reference point, mil, or other) so long as the TC can locate the target.

TASK: LOAD MAIN GUN

PM: Announced "UP" Within 6 Seconds

If the loader fails to announce "UP" or announces it before he has completed the preceding steps, tell him the correct procedure.

If the loader announces "UP" but not within 6 seconds but does not fail any preceding PM, have him practice the procedure gradually improving speed.

If he does not announce "UP" within 6 seconds and you have identified other causes of time failure, correct these.

PM: Announced IDENTIFIED

If the gunner does not announced IDENTIFIED immediately after the TC's lay of the gun or if he is slow in announcing ON THE WAY, check the hand-off technique between the TC and gunner:

- Be sure the TC slows his lay just before the gunner takes over.
- Be sure the TC drops down onto the GPS extension as part of the lay.
- Be sure the gunner lets the turret stabliize after slewing.
- Be sure the gunner searches for target in 3X and lays on target in 10X.

If the techniques are correct but the hand-off is slow, have the TC and gunner practice the hand-off to increase their speed.

BL

TASK: LOAD MAIN GUN

PM: Kept Body Clear of Recoil

Have the loader check the position of his body and the recoil path before announcing UP.

Have the loader practice the procedure slowly establishing the limits of his body in relation to the recoil path. Once established have him practice concentrating on speed.

PM: Responded To TC Commands

The TC is responsible for the speed, direction and movement of the vehicle and to issue those directions to the driver. The driver is responsible to carry out the TC commands accurately with minimal subsequent instructions and with the least possible disruption to the crew.

If the TC issues insufficient or incorrect instructions:

- Be sure he has developed plan for where the tank must be at all times.
- Be sure he has developed a means of conveying information to the driver through short, meaningful instructions.
- Be sure he anticipates situations before they arise.

(More on next page)

TASK: UNLOAD MAIN GUN

BL 2

If the loader receives a NO-GO on any PM 1 through 6, retrain him on the entire task.

If the loader receives a NO-GO on PM 7 or 8, show him how to perform the step or steps correctly.

PM: Responded To TC Commands (Cont'd.)

If the driver does not follow instructions or carries them out incorrectly:

- Be sure the driver practices the driver skills of turning, accelerating, braking and steering.
- Be sure the driver has selected probable alternate routes.
- Be sure the driver is monitoring the situation.
- Be sure the driver understands the meaning of the TC commands.

BR

Have the TC and driver practice on varying terrain reacting to different situations. Make sure they work out a verbal shorthand that means the same things to both.

1. **Drive Tank During Firing**

2. **Fire From a Halt and Hull Defilade**

PM: Announced ON THE WAY

If the gunner does not announce ON THE WAY you must determine that other crewmembers have performed the steps correctly leading up to this step.

Be sure the crew has established communications.

Be sure the gunner is anticipating the TC and loader actions.

Be sure the TC knows how to take control or issue instructions if the gunner is experiencing problems.

Be sure the driver is not interfering with the gunner's actions.

G

TASK: DRIVE TANK DURING FIRING

If the driver fails two or more PM you must set up a training course for him. Use the course you ran the test on and show him what actions he must take on each part of the course by talking him through each position or occurrence. Have him practice with less guidance until he can perform with minimum directions. Work out with your driver what your commands mean until he can perform with minimal verbal guidance.

If the driver fails any one PM tell him what he did wrong and practice at least once with him on the entire course.

28

PM: Crew Completed Engagement Within ___ Seconds

If the crew misses the time factor you must determine the crewmember or event that caused the delay.

Be sure that crewmembers are reacting immediately to each other.

Be sure that crewmen are anticipating each other's actions.

Be sure that the tank commander is taking control or issuing instructions in case of a delay.

28

TASK: FIRE FROM A HALT AND HULL DEFILADE

PM: Brought Tank to a Smooth Stop

Have the driver practice applying the brake immediately after the command "DRIVER STOP." Make surethe driver knows there is no engine drag to help slow the tank. Have the driver practice applying different pressures on the brake until he can stop the quickest with the least disruption to the crew.

PM: Crew Reported Status

If the crew does not report the status of their station after the completion of the engagement or the TC does not request status, have the TC establish a procedure to accomplish this within the crew.

TASK: FIRE FROM A HALT AND HULL DEFILADE

PM: Moved Into Hull Defilade Position

Insure you and the driver have worked out "short-hand" communication and that he can follow your commands with minimum verbal guidance.

Insure that the driver knows what a hull defilade position is. Have him practice by picking out likely hull defilade positions without moving into them. Critique his choices.

Insure that the driver is constantly searching for hull defilade positions while driving. Have him practice selecting his route so that he is never more than 30-45 seconds from a possible hull defilade location.

(more on next page)

TASK: FIRE FROM A HALT AND HULL DEFILADE

PM: Moved Into Hull Defilade Position [Cont'd.]

Insure that the driver knows that to move into hull defilade he must move forward until his vision is masked by the defilade. Have him practice taking up the position until he recognizes when he is in hull defilade.